RAILROAD GAZETTE

FRIDAY, AUGUST 26, 1898.

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Contributions.

The Rail Joint Committee.

New York, Aug. 19, 1898.

To the Editor of the "Railroad Gazette:"

I have read your editorial on the Rail Joint Committee (Aug. 19) and agree with you in every point made.

I have had all these ideas and views in mind in an indefinite shape, but you have put them together in admirable, logical and concise shape. I trust the committee may eventually be appointed.

I had a letter from a party out West recently (a member of the Society), and he said the Society was losing influence, as it was doing "nothing tangible." The conditions have changed from 25 years ago. Today the technical press absorbs the best of technical descriptive matter, and engineers do not consider it the height of their ambition to use the American Society Proceedings for a depository of their professional achievements. M. AM. SOC. C. E.

Specifications for Air Brake Hose.

To the Editor of the Railroad Gazette:

I have read with much interest Mr. Waitt's communication, and also that of the Peerless Rubber Company, in your issue of July 29. I think Mr. Waitt is in error in several instances, especially as to the stretching of rubber once, in a test, being a measure of its life. Let Mr. Waitt the next time he has an opportunity, go into a rubber store and examine the sheet packing. He will find some that is quite flexible, stretches nicely and seems to be a very good article. Other sheet packing he will find much stiffer, and not near as pleasant to handle as the first, and he will learn that the soft, flexible packing is the cheapest thing in the store. His stretching test is as unreliable as the unwinding test. Rubber makers themselves know very little about what the composition of a sample is from examination of it, or what its life will be. Rubber-making is not an exact science.

As an instance of this, a pumpmaker bought some pump valves from a rubber company located not over 1,000 miles from the home city of the Peerlees Company. Forty cents per pound was the price paid for these valves. Believing this to be too high, the pumpmaker cut a piece out of one of the valves and sent it to the rubber company which had made it and asked what that quality of rubber could be duplicated for. The rubber company said 16 cents.

I think the comparison of car wheels and air-brake hose is quite to the point. There are a great many of both used by railroads. What the roads want from both is the greatest life for the least money, and there is no comprehensive test that ordinary roads can use to determine what the life of wheels or hose will be. The general practice is to buy of a good, reputable maker on the mileage or time basis, and the result in car wheels has shown that the perfection of service and minimum price is the result. About 99 per cent. of the roads in the United States buy both car wheels and air-brake hose on the service basis; yet Mr. Waitt says this almost universal system is worse than a failure, because the maker claims a release from defects as not belonging to him. Now it is no more difficult to determine what defects of hose belong to the maker than it is in car wheels. A slid-flat wheel or a broken wheel in a wreck is not a maker's fault, while a chill crack, a "cold shut" tread or a cracked bracket in a new wheel is.

Since roads have so largely quit using the dummy coupler kinking of hose has largely disappeared, showing clearly that kinking is due more to the torture of the hose than to any inherent fault of the hose. Hose maliciously cut with a knife is not the maker's fault, and this is not difficult to determine. Cars are loaded with lumber by employees with long spikes in their shoes, to prevent their slipping, who often use the coupled air hose as a step to aid them in getting to the top of the car, and it is clear that hose so punctured are not chargeable to the hosemaker. Hose that are cut through at the end of the coupling shank, or the end attached to the angle valve on the car end, are in nearly every case due to the fact that the angle valve or cock is hard to turn by hand, in which case the brakeman uses a coupling link or pin to hammer the angle cock handle open. Of necessity the round pin or link slips off the cock handle or misses it entirely, and the blow falls on the hose directly over the end of the coupling shank inside.

On the free end of hose into which the hose coupling shank is forced most failures occur. A common cause is that the shank of the coupling has rough projections on it, or "fins," which tear or slit the inner tube of the hose when the coupling is forced into it, thus destroying one-third of the hose's thickness before even it is put into use. This is not a hosemaker's fault. Hose with but 1¼-in. opening of the inner tube is too small; the coupling shank stretches it and the "friction" beyond its elastic limit, as will be found by leaving the coupling in the hose for a few days and then pulling it out. The hose end will never return to 1¼ in. opening. The result is that the hose end for 3 in. soon becomes cracked lengthwise, and its destruction is hastened by the rusting of the clamp on the outside and the rusting of the coupling shank on the inside. The road has simply ordered too small hose, or hose whose ends are not enlarged sufficiently. Clearly this want of knowing what it wants on the part of the road is no fault of the hosemaker.

The inside end of the coupling shank is nicely constructed to cut or wear through the inner tube of the hose when the hose are coupled. The shank acts as a lever, the resistance being the tendency of the hose to remain straight. The effect is to press the lower edge of the shank against the lower part of the inner tube at their point of contact and cut the inner tube, which so weakens the hose that it often bends nearly at right angles across the end of the shank; that is, it kinks at this point, and it is all due to a wrongly constructed shank end. A soft rubber cap covering the end of the shank, or the whole shank, and extending back on the outside of the hose, would very largely protect the end of the hose against failures of any kind or rust of the clamp; and 95 per cent. of hose failures occur within 3 in. of the hose ends. This cap should be soft rubber, so as to "give," or get out of the way of rough spots or fins on the coupling shank.

Now, when air hose fail from any of the above causes the failure cannot be charged to the maker, and it is entirely immaterial whether the hose have passed or have not passed Mr. Waitt's proposed tests, or whether they cost 60 cents a foot or 40 cents a foot; they will fail from these causes; and the 60-cent hose after passing the tests will fail just as soon from these causes as the 40-cent hose.

It is no argument to say that some roads do not keep a systematic account of wheels, hose, etc. If they do not count or weigh car wheels or coal, or count air-hose on receipt of same they have themselves alone to blame, and this is no argument in favor of a test of air-hose which does not test them at all in the line of their service, and simply results in raising the price 50 per cent. How does Mr. Waitt pretend to say or assume that a road so loose in its methods—if any such exist—as not to keep accounts, would develop all at once an exactness of habit to the extent of testing hose by unwinding the friction?

The Peerless Company refers to what the Government does, or did do, in rubber specifications. The Government makes and has made more mistakes in its specifications than is commonly supposed, and its practice is often absurd.

It will require now to fill the M. C. B. test an air-brake hose costing about 60 cents a foot. If the filling of this test is what a road wants, then it must pay about 60 cents per foot for hose. If it wants the largest life for the least money it can get it by buying hose of a reputable maker at 40 or 38 cents a foot. Let any road make a test of as good a hose as a reputable maker can put out at 40 cents, and test it in actual service with hose filling the M. C. B. specifications at or near 60 cents per foot, and it will be astonished to find that there is no difference in the life or service. It is not necessary that a record be kept of every piece of hose used. The M. C. B. test proposes, I believe, to test but one in 50 pieces, which passes or rejects that particular lot of 50. Let a road, then, when it puts in service 100 pieces of hose keep account of any two pieces; the result will show the value of that lot, and it will surprise that road, especially if it has been a believer in gilt-edged machine tests. The point made by the Peerless Company, that some makers are selling air-hose at common water-hose prices, has no bearing. No reputable maker will do it, and a road that buys air-hose at 28 cents ought to get beat. Let the road select a maker of good reputation and they will have no trouble, because such makers are not in business to make one sale of poor material to a road and then never make another sale to the same road. G. P. CAMPBELL.

The Engines and Engineers of the Oregon.

All engineers must have realized that the splendid work done by the battleship Oregon was largely due, not only to the excellence of her engines, but to the skill and vigilance of her engineers, and yet we have nowhere seen in print the names of the Engineers. The Chief Engineer is Robert W. Milligan, A few days ago there appeared in the New York Sun a most interesting letter, written by First Asistant Engineer Cleland Nelson Offley, U. S. N., who had charge of the Oregon's starboard engine room. We cannot give space to the entire letter, which is admirable in form and style and important in its information, but we give below a few extracts from it.

The Oregon is a first-class coast defense battleship of about 10,000 tons displacement at normal draught. When she goes to sea her actual displacement is something over 12,000 tons, and her draught of water is then over 27 feet, and she was in this latter condition when we started out from San Francisco, having on board at that time about 1,500 tons of coal.

The ship is driven by twin screws, worked by triple expansion engines. There are four large main boilers, double ended, cylindrical, each 15 ft. in diameter, 18 ft. long and having eight furnaces, four in each end. The dimensions of each furnace are 3 ft. diameter, and length of grate 5 ft. 6 in., giving a grate surface for each furnace of 17¼ sq. ft., or 552 for all main boilers.

We left San Francisco on March 19, and proceeded under three boilers direct for Callao, which port we reached on the morning of April 4, having expended during this run of 16 days 900 tons of coal. This we consider a remarkably efficient performance, having averaged 4.24 knots per ton of coal. The revolutions of the engines during this run were remarkably steady, averaging 75 revolutions per minute for day after day without a variation of a tenth of a revolution.

On two different occasions one of the boilers in use began to leak slightly around the back ends of some of the tubes. On both occcasions we immediately started fires in the idle boiler and allowed those in the leaking boiler to die out, and as soon as possible the boiler maker was sent in to re-expand the tubes. During all this time the water in the boilers was perfectly fresh, our evaporators and distillers having a capacity of 5,000 gallons a day, which was sufficient for all purposes, including the necessary make-up feed for the boilers.

On the afternoon of March 27 smoke and gas were discovered to be coming out of one of the coal bunkers. This bunker was over half full at the time, having probably between 65 and 70 tons in it. There was nothing to do but dig for the fire. So we started in, working a couple of men in the bunker for about 10 minutes at a time, and then sending in a couple more to relieve the first. After about two hours' work the fire was reached, only about a shovelful of live coal being found, but probably a couple of tons so hot that it was giving off smoke and gas. After about four hours' steady work all the dangerous coal had been removed and no further trouble was encountered. Naval Cadet Jenson, one of our engineer cadets, was temporarily relieved from watch duty and put in charge of the fire gang, and the way he went at it, never paying the least attention to the excessive heat and foul air and gas in which he was working, was wonderful to see.

On arriving at Callao began some real work. I started in on the starboard engine and Reeves on the port engine, and we overhauled connections, scraped brasses where necessary, examined, cleaned and repaired air pumps, circulating pumps, wiped out and oiled all the main cylinders and valve chests. Fortunately for me, my engine was in pretty good shape, needing only a slight amount of keying up here and there. Reeves, however, found one of his main crosshead slippers so badly cut and scored that it was deemed best to remove it and put in place a spare one which we carried on board. This sounds easy, but it required 24 hours' continuous work, as it had to be fitted exactly, the face carefully scraped to a true surface, and, finally, the guides nicely adjusted.

In the meantime the firemen and coal passers were engaged in trimming the bunkers, under the supervision of our two cadet engineers, who took 24 hours' watch at a time.

April 7, out we started again, using three boilers and averaging something over eleven knots per hour until the evening of the 9th, when the fourth boiler was put on and the average speed increased to about thirteen knots, and this was kept up until the evening of the 16th, when we reached Port Tamar, just inside the entrance of the Straits of Magellan. We had a few leaky tubes in one boiler a day or so after leaving Callao, and stopped them as soon as possible. Soon after this a small amount of salt water

got into our boilers. This meant a certain amount of scale, but fortunately the amount was so small that it merely served to make our tube ends tight, without being enough to cause any bad effects on the boilers. At all events, from that time until long after our arrival off Santiago we did not have another leaky tube.

We spent the night at anchor in Port Tamar, and the next morning started out with the intention of making Sandy Point by dark. This required a semi-forced draught run. We ran our blowers at such a speed as to give an air pressure of one-quarter of an inch of water, and were thus able to run the engines at a speed of 107.3 revolutions per minute, giving the ship a speed through the water of 14.6 knots per hour.

Sandy Point was reached in the evening, and the next morning (April 18) began our usual work—coaling ship, cleaning, repairing and overhauling machinery. Of course, the only way to keep the ship going was to turn to at every opportunity and do everything possible in the time allowed; but it was beginning to tell on all of us. We all had to stand watch at sea, and as soon as port was reached all hands of the engineer's force had to go at the work and keep it up, going for every little thing that showed the least sign of wear, and not waiting even for it to show, but hunting for things of which there was the least probability of their becoming out of order. But all hands stood the strain well.

Key West was reached on the morning of the 26th of April, thus completing the most remarkable and successful performance ever undertaken by a battleship.

In the first place the machinery of this ship was beautifully and strongly built, and above all was erected in the ship with the greatest care and thoroughness. Great credit is therefore due to her builders and to the inspectors who supervised the work. From the day she went into commission the greatest care has been taken to keep everything up as nearly to perfection as possible. On the discovery of the least defect in any part it has been remedied immediately. Whenever a run has been made, no matter how short it may have been, on reaching port again the cylinders and valve chests, air pump valves, etc., have been carefully examined, cleaned and oiled. The most careful attention has been paid to the condition of the boilers, and every endeavor has been made to avoid the use of salt water in them; that, indeed, is the point to which our success is largely due. Every leak, however small, in the boilers themselves, in the steam pipes, in the engines or in the condensers, has been stopped just as soon as possible, and thus only has it been possible to keep down the amount of water necessary for make up feed to such a point that our evaporators have been able to furnish it, in addition to the water required for all other purposes.

The following is a summary in tabular form of our runs. The data are taken from the time of getting fairly under way, the time while entering and leaving port being eliminated. The coal does not include that used while lying in port, but includes coal consumed for all purposes while at sea:

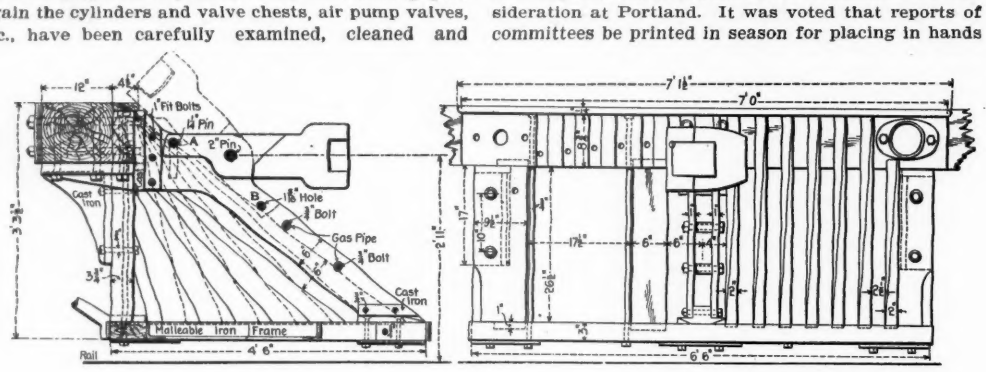
	Distance, Knots.	Time, Hours.	Speed, Knots per Hour.	Coal, Tons.	Knots Run per Ton of Coal.
Bremerton to San Francisco	827.7	72	11.49	221.0	3.74
San Francisco to Callao	4,076.5	371	10.99	962.0	4.24
Callao to Port Tamar.	2,529.9	212	11.93	785.0	3.22
Port Tamar to Sandy Point	132.0	9	14.55	66.0	2.00
Sandy Point to Rio Janeiro	2,247.7	223	10.08	657.0	3.42
Rio to Bahia	700.0	*	*	288.0	....
Bahia to Barbadoes....	2,229.0	193	11.55	620.0	3.59
Barbadoes to Jupiter..	1,683.9	142	11.86	478.5	3.3
Jupiter to Key West..	280.0	27	10..37	77.9	3.6
Totals	14,706.7			4,155.4	

*Speeds variable. Data unreliable.

Chesapeake & Ohio Reversible Pilot Coupler.

Many railroads are fast replacing the old link-and-pin pilot drawbars of locomotives with couplers having the M. C. B. standard head. Some roads have had trouble in getting a suitable attachment for the pilot coupler, and in this connection the accompanying engraving may be of interest as showing the arrangement of the reversible pilot coupler designed by Mr. W. S. Morris, Superintendent of Motive Power of the Chesapeake & Ohio. The method of attachment shown is now the standard of that road, and has been found satisfactory after several years' trial.

The coupler shank is inserted between two 1-in. wrought iron plates 3 in. apart. These plates are bolted to iron castings at the bumper beam and at the nose of the pilot and stiffened between by bolts and gaspipe thimbles. The shank of the coupler is made of a special shape, as shown, so as to turn about a 2-in. pin while a 1¼-in. pin, provided with a handle, is placed either in the hole A or B, depending upon the position of the coupler; this second pin keeps the coupler rigid. By making the coupler reversible it can be turned backward when not in use, thus getting it out of the way and decreasing the moment of the overhanging weight of the pilot.



Reversible Pilot Coupler of the Chesapeake & Ohio.

New England Roadmasters' Association.

The sixteenth annual convention of the New England Roadmasters' Association was held at the Revere House, Boston, Aug. 17 and 18, with President Samuel Greer of Westfield (N. Y., N. H. & H.), in the chair. The first day was devoted to business, as was the forenoon of the second. A visit to the new South Terminal Station by invitation of the resident engineer, George B. Francis, occupied the latter afternoon and a banquet wound up the proceedings in the evening. President Greer opened the convention with a brief address, in which he congratulated the members upon the fact that it was conceded by all that the Association had been valuable in securing uniformity in their work; that better roadbed has been secured was shown by the heavier trains and faster speed that has resulted. Secretary F. C. Stowell's report as treasurer, showed a balance of nearly $500 on hand. Officers were elected as follows: President, James M. Torr, Woonsocket, R. I. (N. Y., N. H. & H.); Vice-President, E. A. Haskell, Springfield, Mass. (B. & A.); Secretary and Treasurer, F. C. Stowell, Ware, Mass. (B. & M.) It was voted to meet next year at Portland, Me., but the time was left for the Executive Committee to decide. The matter of extending the territory of the Association was referred to the Executive Committee for consideration at Portland. It was voted that reports of committees be printed in season for placing in hands of members of the Association before discussion thereon. Resolutions upon the death of Messrs. F. M. Sargent and B. Braley were adopted. The Association in a body visited the exhibits in an adjoining room and each supply man was given an opportunity to explain the merits of his exhibit. The visit to the South Terminal was very interesting, Mr. Francis and Superintendent Sanborn accompanying the visitors about the mammoth structure and explaining various features. The address of Mr. Coates was given on Wednesday evening, the ladies being present; and afterward, by invitation of the supply men, all visited Keith's Theatre.

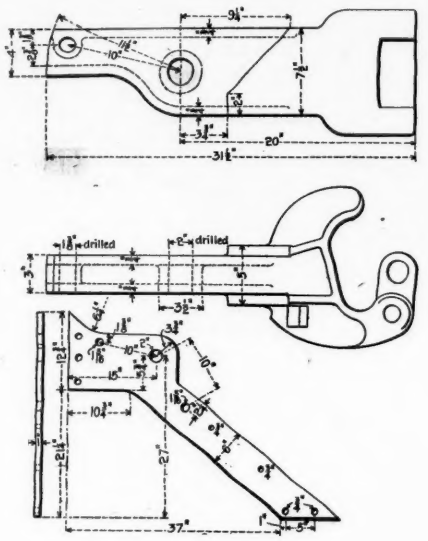
Openings at Ends of Rails.—Messrs. French, McManama and Tuttle were the committee on this subject. The length of rail considered was 30 ft. and the committee held that with the temperature at 90 degs. or above, rails should be laid with ends touching; the maximum opening should be ¼-in. Metal shims should be used, the thickness to depend on the temperature, as indicated by a thermometer. Spikes should be driven in the joint slots immediately after a rail is laid. Provision for the lengthening and shortening of rail should be made by the difference in diameters of joint bolt and hole in rail. Holes in joint bar should be just large enough to take bolts. The committee recommended four bolts; 3 in. from end of rail to center of hole; 6 in. between the two holes.

In the discussion following this report several members spoke of the importance of not leaving too much space. On motion of Mr. Coates (N. Y., N. H. & H.), the report was amended by making ⅜-in. the maximum allowance recommended, and the report was then adopted.

Switch Targets.—The committee, Messrs. Osgood, Lentell and Curtis, sent out circulars but replies were received from only a few roads. The committee recommended a double target for main line switches, showing a white field for "all clear" and red for side track by day, and a green light for "all clear" and a red light for side track by night. For switches leading from through or turnout sidings a double target, with white field for "all clear" and white with black stripe for outer track; and if night signals are required they should show green for "all clear" and white for outer track; lanterns to have 3-in. lenses. All other switches to have single targets about 12 in. x 14 in., painted white with black stripes. After some debate the recommendations of the committee were amended by providing that three colors, red, white and green, be used, the color on the target to correspond to the color on lamp, and the red and white to be used on all main line switches leading to side tracks. Green and white to be used at all main line junction switches, green and white on all side track switches, and the green or red targets to be a distinctive shape from the white.

Best Wood for Ties.—The committee was made up of F. R. Coates, R. P. Collins and J. A. Patch. Chestnut is very durable, lasting in track from eight to ten years, and owing to the quantity grown in this section it is preferable to others. A cedar tie of good heart will last as long as any other, but the supply in New England is insufficient. White and rock oaks should rank next to cedar, but other varieties of the same wood are likely to be supplied. The committee recommend chestnut and cedar when they can be obtained. The committee recommended that all ties be cut between Oct. 15 and March 1. As wood is still plentiful the committee would not recommend metal ties. The report was accepted.

Creeping Rails.—Messrs. T. J. Sullivan, J. W. Shanks and F. E. Sibley were the committee on "What is the Best Method of Preventing Creeping." They said: In laying rails leave the opening between the ends only as large as is absolutely necessary for expansion; keep track in as perfect surface and line as possible; keep track well filled between and at ends of ties; also, keep spikes driven down flush to rail; then every rail must be held in place separately. With rails of 75 lbs. per yard or less, if fish plates are used, rails can be held in place by punching two square holes at each of the ends in the base of the rail and driving spikes in these slots. With angle bars, with two or three bolts make holes in angle bars and spike to tie at joint. With rails of greater weight the committee recommended a hole drilled through neck of rail in one or two places and a check plate bolted through the neck of rail, then curving down the outside over base of rail, then turned under the base and spiked to the tie through a slot on the outside and through two holes on the inside. After a short discussion the report was accepted.



Gage of Track on Curves.—The same committee reported on this subject, saying the widening of gage on curves depends wholly on type of engine or car wheel base to be run on the curves. We know of no car with a wheel base long enough to require any widening of gage. There are engines in use on nearly all railroads with driving wheel base of such length as to require widening of gage on curves of more than 12 degs.; but with engines having pony or 2-wheel truck, or American with 4-wheel truck no widening is necessary. There is a mistaken idea that because engines with blind drivers in front sometimes drop off the outside of the inside rail on a curve, that the gage should be widened. This can be overcome by laying a third rail on the outside of the inside rail, the space to be about 2½ in. between heads of rails. With engines having a driving wheel base of 14 ft. or 16 ft curves must be widened. When the rigid wheel base of engine is 16 ft. the gage of track must be widened for all curves more than 12 degs.; about ⅛-in. for each degree. With curves of 20 deg. a special engine should be used.

In the discussion that ensued, W. E. Clark (B. & M.), told of his early experience with a curve which he was never able to keep in gage until he let the locomotive fix the widening. It was an 8 deg. curve and the locomotive widened it ¾-in.; thereafter for 20 years he had no trouble. On motion of Mr. Coates the report was amended by recommending

that widening begin on 6 deg. curves; no widening to be over 1 in.. The report was then adopted.

Iron Pipe for Replacing Box Culverts.—The committee, Messrs. E. E. Stone, M. C. Hamilton and A. C. Stickney, recommended the use of heavy cast-iron pipe coated with a good preservative, in place of stone; on account of their durability, the ease and facility of construction and the less frictional resistance offered to the flow of water. This report was adopted.

Tamping Tracks by Compressed Air.

On the evening of the 17th, Mr. F. R. Coates read a very interesting paper on "Recent Experiments in Tamping Tracks by Air" and also showed the working of the machine. Wonderful advances have been made in transportation by rail, but we surface tracks just as George Stephenson did. We realize its general ineffectiveness, but few seem to appreciate its importance as an item in the general operating account. There are no statistics, either here or in Europe, segregating the expenditure for this unsatisfactory, irregular, endless and undoubtedly expensive work. The question is how to surface the track with the least injury to the ballast and the bed it has made. The answer is, work from the ends of the ties. The most promising effort in this direction has been in experimental work during the past five years in the use of the air blast. Its possibility once determined, the mechanical means were to be devised. The Root blacksmith blower has thus far been found best adapted for conversion to this use. With this, gravel, not too coarse, can be successfully blown under a tie so as to make a firm support. The ballast is cleared away from the end of the tie, the tie is raised as much as may be desired and the gravel is blown under. It can be forced the whole length of a tie from one end, and will go three-fourths the length easily. The apparatus consists of a vertical funnel or hopper for receiving the sand or gravel, bent at the lower end toward the tie, with an air pipe introduced at the bottom. The blower for forcing air through this pipe into the gravel is clamped to the rail, only seven seconds being required to take it off. The nozzle, placed against the opening under the tie, is about ⅞ in. by 2½ in.

The blower is used by the ordinary track gang of four men, one or two of them being required to furnish the power, and all being engaged in clearing the tie ends while waiting for trains. There is no possibility of "soldiering" by any one man, for the pause of one man stops the work of all. The mechanism having demonstrated its practicability, a serious problem is how to place suitable material convenient to use. The ordinary method of screening the material meets this requirement. The mechanism in its present development is entirely a "surfacing," not a "track raising" device, and the range of its applicability would seem to be from ¼ in. up to 1½ in. and the size of the material up to ¾ in. Material passed through a ¾-in. round screen can be used, but its flow is much slower than the smaller sizes, as also is the speed of its projection. This can be readily realized when we know that the compressor at a fair speed shows but 8-in. mercury pressure for the air which is conveying the material beneath the ties. Where the electric current is available a portable motor may furnish the power for the blast. With the experimental work so far the results are decidedly in favor of air tamping. In the experiments made at Stamford, Conn., on the New York, New Haven & Hartford, two adjacent pieces of track, each fourteen rails length, were taken, they being under the same conditions of traffic. One was surfaced by men working on a spurt, and the other by the machine. The former attained a speed of 5 ft. per man per hour, and the latter 8.2 ft. No allowance was made for screening the material, which would probably reduce the speed to 8 ft. per hour. In one year it required the expenditure of 36 hours of one man's time to maintain the surface of the portion put up by hand and of two hours for that which had been surfaced by the machine. Air-tamping is believed to have solved the problem of the tamping of the interior of the steel tie, but this requires no consideration from Americans at present.

EXHIBITS.

Continuous Rail Joint Company of America, Newark, N. J.—Sample joint and transverse sections of the same.

Coughlin-Sandford Switch Company, New York.—Model of the Coughlin swing-rail frog.

Dilworth, Porter & Co., Pittsburgh, Pa.—Samples of the Goldie spike in soft steel and Goldie claw tie plate.

Eyeless Tool Co., New York.—Samples of eyeless steel picks, air-tamping and clay picks.

Fairbanks, Morse & Co., Pittsburgh, Pa.—Samples of Sheffield 24-inch pressed steel wheel and Barrett track and bridge jacks; model of velocipede car.

Wm. Goldie, Jr., & Co., Pittsburgh, Pa.—Samples Goldie tie plug.

McMullen Woven Wire Fence Co., Chicago.—Woven wire railroad fence.

National Lock Washer Co., Newark, N. J.—Samples of National lock washers.

A. B. Norton, Boston.—Samples of the Norton patent ball-bearing lifting jacks.

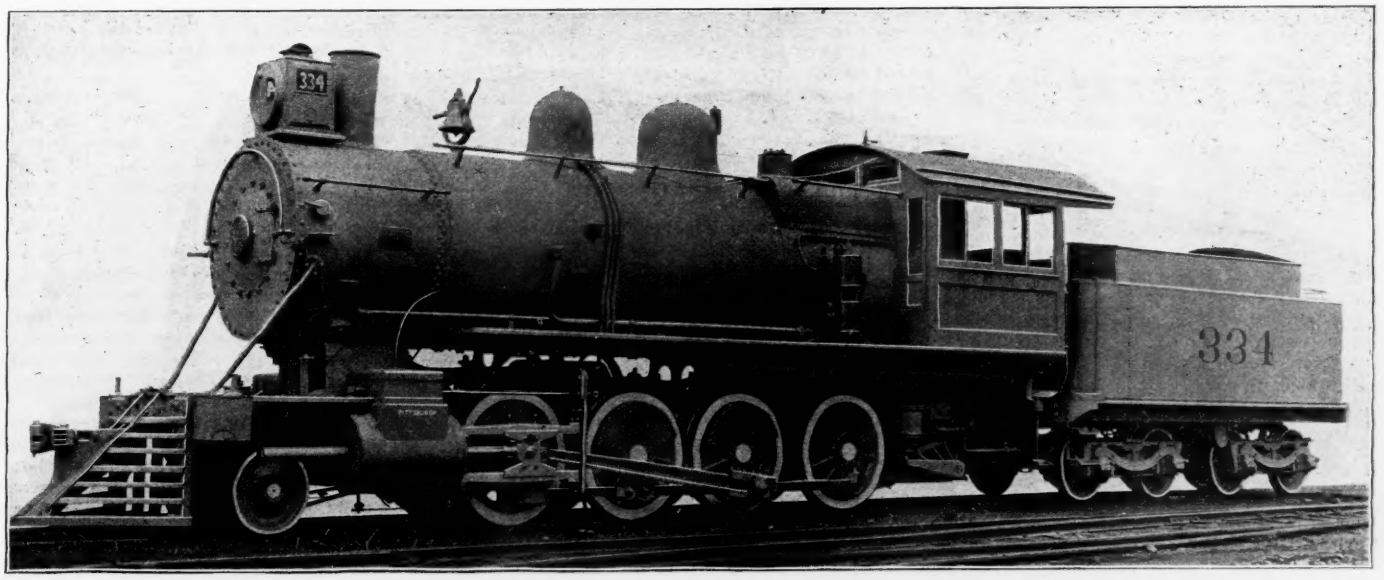
Pearson Jack Co., Boston.—Model and full size samples of the Pearson rachet jack.

Pennsylvania Steel Co., Steelton, Pa.—Model of New Century switch stand.

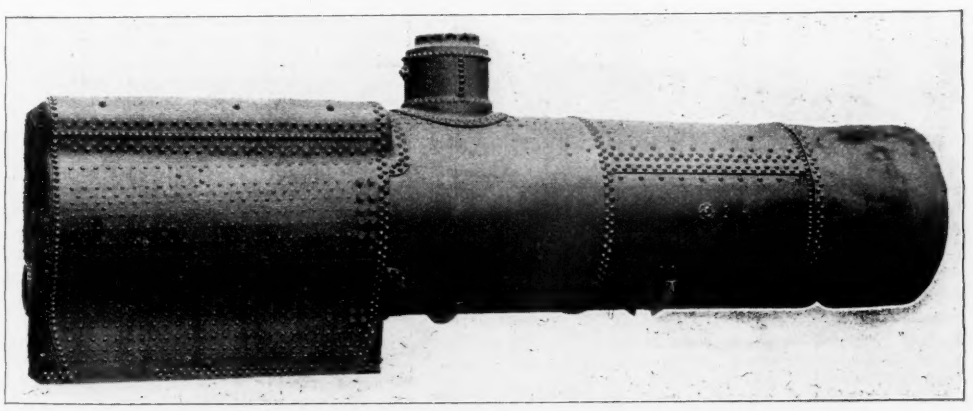
Q & C Co., Chicago.—Samples of jacks.

Ramapo Iron Works, Hillburn, N. Y.—Models of switches and automatic switch-stand.

Weber Railway Joint Manufacturing Co., New York.—Samples of the Weber rail joint.



Pittsburgh Consolidation Locomotive for the Burlington & Missouri River Railroad.



Boiler of Consolidation Locomotive—B. & M. R. R.

Pittsburgh Consolidation Locomotives for the Burlington & Missouri River.

The Pittsburgh Locomotive & Car Works has delivered to the Burlington & Missouri River four consolidation freight engines built under the direction of Mr. G. W. Rhodes, Superintendent of Motive Power of the Chicago, Burlington & Quincy. The engravings from photographs show in general the completed engine and the boiler. These engines will be used on those portions of the road running through the Black Hills. The heaviest consolidation engines which have before been used there could haul 10 loaded cars up the maximum grades, while the new engines are designed to haul 15 loads under the same conditions. The important features of these engines are their great weight and large boilers. The general description follows:

Burlington & Missouri River—Consolidation Freight Locomotive.

Fuel	Bituminous coal
Gage of track	4 ft. 8½ in.
Total weight of engine in working order	180,000 lbs.
" " " " on driving wheels	166,000 lbs.
Weight of tender, with fuel and water	98,600 lbs.
Driving wheel base of engine	15 ft.
Total " " " "	23 ft. 6 in.
" " " " " and tender	53 ft. 2 in.
Height from rail to top of stack	15 ft.
" " " " center of boiler	8 ft. 9⅝ in.
Cylinders, diameter and stroke	22 x 28 in.
Slide valves	Richardson balanced
Piston heads	Cast steel, Dunbar packing
" rods	Steel, 4 in. diameter
Boiler jacket	Cold rolled pickled steel, painted
Type of boiler	Belpaire
Diameter of boiler at smallest ring	74 in.
Crown sheet, supported by stay bolts	1⅛ in. diameter
Stay bolts—	1 in. diameter, spaced 4 in. from center to center
Number of tubes	292
Diameter of tubes	2¼ in.
Length of tubes over tube sheets	14 ft. 6½ in.
" " firebox, inside	114 in.
Width " "	40 in.
Brick arch	Supported on studs
Working pressure	180 lbs.
Kind of grates, R. R. Co's standard	Cast-iron
Grate area	31.67 sq. ft.
Heating surface in tubes	2,488.4 sq. ft.
" " " firebox	188.6 sq. ft.
Total heating surface	2,675 sq. ft.
Diameter of driving wheels outside of tires	62 in.
" and length of journals	9 x 10 in.
" of truck wheels	30 in.
" and length of journals	6½ x 9 in.
Type of brakes	Westinghouse American
Type of tank	Hopper, R. R. Co.'s standard
Water capacity of tank	5,000 U. S. gallons
Fuel " " "	10 tons

Per Diem Car Service.

A meeting of the representatives of the roads comprising the International Mileage Per Diem Association was held in Chicago, Aug. 17. As announced in our issue of July 1, page 474, this Association is composed of five roads: The Illinois Central; the Chicago, Milwaukee & St. Paul; the Atchison, Topeka & Sante Fe; the Missouri, Kansas & Texas, and the Columbus, Hocking Valley & Toledo, and commenced operation under Daly's plan of car service settlement from July 1. The Burlington, Cedar Rapids & Northern joined the Association on Aug. 1.

The Secretary's report contains the following statements:

"In putting the plan into effect there has been no case of interchange come up but what has been adjusted to the mutual satisfaction and interest of both parties concerned, and we have had no complaint from our respective traffic departments regarding the same. We have interchanged equipment more promptly and freely than heretofore, but have restricted our orders for cars to actual current requirements. Knowing that member roads will not order cars for prospective traffic or for storage purposes, their orders have been filled promptly and traffic protected with the minimum number of cars. Our settlement reports have been rendered promptly and accurately, and we find no trouble in determining and drawing for balances.

"Present indications point to a heavy movement of freight during the coming fall and winter, and it will be necessary to secure an increased movement of cars to prevent loss of tonnage.

"A comparison of the settlements for July, 1898, made on the exchange per diem plan, and for 1897 on the straight mileage plan, show that working under the per diem plan the average miles per car per day increased 52.1 per cent., or 9.8 miles per car per day."

In the following statement the figures represent, for each road, the service on that road of all cars borrowed from the four other roads in the Association:

	1898.		1897.	
	Days.	Miles.	Days.	Miles.
I. C.....	7,644	202,766	9,737	151,009
C., M. & St. P.....	7,054	188,938	7,898	136,235
Santa Fe....	4,584	141 104	4,626	102,985
C., H., V. & T.....	201	3,205	202	2,044
M., K. & T.....	1,336	49,975	1,347	51,322
	20,819	585,998	23,720	446,595

Average miles per car per day, 1898 (on per diem basis), 28.6.

Average miles per car per day, 1897 (on mileage basis), 18.8.

Compiled in the aggregate the result is as follows:

Average miles per day, 1897, 18.8; 1898, 28.6.

Average earnings per day, 1897, 11.3; 1898, 17.1.

Per cent. of increased movement, 52.1.

Per cent. of increased earnings, 52.1.

It is interesting to note that as directly affecting their car service revenues, the members of this Association state that there was not a deviation of $200 either way, during July, in any one of their accounts, resulting from the operation of the new system.

As affecting operation, the results have been gratifying in the extreme, cars interchanged between the five roads in question showing an increase in average daily performance while away from the home line of 52.1%, as compared with July, 1897.

An early result was the development of certain irregularities which were not noticed under old methods; for instance, it was found, among other things, that at certain points there was a marked discrepancy in agents' reports of interchange, as to the exact time of delivery or receipt of cars. In order to overcome this reports from interchange points will hereafter be checked and verified by agents of each two roads interested. Another development at certain points was the fact that switched cars frequently congest on account of lack of responsible supervision. The delivering agents depend upon the receiving agent to urge upon consignees the prompt release of cars, and the receiving agent, on account of the car having been placed in his company's hands, simply, as he views it, for the convenience of the delivering road, avoids the responsibility, assuming that the delivering road should take proper steps to insure the release of the car by consignee. The consensus of opinion appears to be that the improvement in the service, as a result of the elimination of irregularities of this kind, will more than repay the expense incidental to the inauguration of the per diem plan.

On none of the roads was the empty mileage increased to secure the prompt return of equipment. The factor of increased empty movement, which frequently has been made to play the bug-a-boo in discussions of per diem settlements, appears to have received a severe blow in the results of this experiment thus far.

All of the representatives expressed themselves as satisfied with the results obtained, and did not hesitate to emphasize their belief that the improvement already noted would be even more marked when fall business with its heavy freight movement, has opened.

Tests of an 100-H.P. Otto-Crossley Gas-Engine.*

Introduction.

All of the preparatory work and the actual testing were done in common with Mr. Henry S. Lancaster, '98, and Mr. Burton A. Prince. As the engine was in daily use, furnishing power to the Morgan Spring Co., who so kindly allowed us to test it, we were unable to put a brake on it, and so cannot give its mechanical efficiency. What we have done is to obtain the thermodynamic and the cylinder efficiency of the engine, running a number of tests under the regular shop-load. Two indicator cards have also been analyzed from a single test, by the entropy-temperature graphical method.

Description of the Plant.

The plant, as far as we were concerned with it, consists of a 67-H.P. H. R. T. Stewart boiler, a gas-producer, a scrubber, a gas-holder, and a single-cylinder Otto-Crossley gas-engine, 18½x24 in.

The producer consists of an upright cylindrical tank, about 15 ft. high and 5 ft. in diameter, with a 4-in. water-seal at top and bottom, and a hopper for feeding coal at the top. There is a bed of live coal at the bottom about 4 ft. deep, through which a mixture of air and steam at about 80 lbs. pressure is blown from the bottom, forming the gas. This is known as the Dowson process.†

The greater part of the gas made is used elsewhere in the works. That which goes to the engine passes through the scrubber, where it is purified. The scrubber is an upright cylindrical tank, 4 ft. in diameter, filled with coke, through which a stream of water constantly trickles. The gas enters at the bottom and passes up through the coke, leaving at the top. This removes most of the impurities.

The gas then passes through a large check-valve to the holder, which serves as a reservoir for the engine.

The engine is an Otto-Crossley gas-engine, No. 23098. Nominal H.P., 30; indicated H.P., 100. It works on the Beau de Rochas cycle, and governs on the hit-or-miss plan. . . .

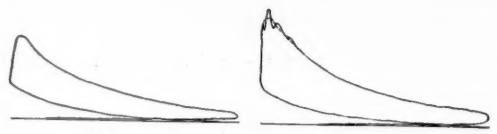
As we were unable to get a meter large enough to measure the amount of gas going to the engine we made use of the gas-holder, which had to be calibrated for the purpose. . . .

After we had made a number of these tests [of the average intake of the engine per admission, in cubic feet, by observations of the drop of the gas-holder during a number of admissions] a valve was put in which would change the air-supply to the engine, so that the amount of gas used by it per admission was no longer constant. Therefore these first tests were worthless, and we had to run one or two after each set of engine-tests.

Description of Tests.

Each test run was of 15 minutes' duration. Readings of the revolution and admission counters were taken at the beginning and end of each test, and from these the mean number per minute was obtained. Indicator-cards were taken every three minutes during the test, starting a minute and a half after the beginning of the test.

Observations of the temperatures of the entering and exhaust gases, entering and exhaust jacket-water, and outside air, were made during each test, so that a mean could be obtained. Also the amount



Normal. *After a missed explosion.*

Sample Indicator Cards.

of jacket-water per minute was found by weighing the amount of water which flowed through the jacket in four minutes, as this was the capacity of our weighing-tank. . . . During each series of tests samples of both admission and exhaust gases were collected for analysis. . . . The gas-samples obtained were analyzed by the Hempel pipette method. . . . The densities, specific heats and calorific powers of the gases were calculated from the following analyses:

Average Analyses for the Gases.

Test 15.	CO_2	O	CO	CH_4	H	N	Calorific Power. B. t. u. per cu. ft
Admission..	6.88	1.0	18.8	4.9	6.27	62.15	129.2
Exhaust.....	13.8	6.4	0.0	...	...	80.8	....
Test 16.							
Admission..	7.8	0.1	13.5	8.4	9.3	60.9	157
Test 22.							
Admission..	7.4	0.0	21.8	2.7	12.7	55.4	138.1
Exhaust.....	11.8	6.3	0.0	...	...	81.9	....

Selected Data.

No. of Test	Total admissions.	Total cycles.	Temperature of jacket-water. Entrance.	Exit.	Weight of jacket-water per min.	Cub ft. of gas per admission
15 A	1,085	1,238	50	161.5	25.2	1.37
15 B	1,045	1,240	49.8	143	30.8	"
15 C	1,053	1,241	50	144	34.8	"
16 A	1,018	1,247	50	146	29.1	1.54
16 B	610	1,227	49.6	148	30.9	"
16 C	849	1,267	49.3	144	30.7	"
22 A	869	1,258	50.4	131	34.2	1.53
22 B	806	1,267	49.6	127	35.1	"
22 C	942	1,255	50	133	28.4	"
22 D	892	1,251	51.8	143	28.7	"
22 E	1,046	1,236	53.6	144	28.0	"
22 F	892	1,255	53.6	145	33.4	"

We found the clearance volume of the engine to be 32.8 per cent. of the piston's displacement. . . .

In the calculation of the specific heats of the mixtures occurring in the engine the following standard values were used:

Gas.	Spec. Heat at Const. press.	Ratio of Sp. heat.
Air.	0.2378	1.408
CH_4	0.5929	1.316
CO	0.2425	1.369
CO_2	0.2012	1.308
O	0.2175	1.410
H	3.4062	1.410
N	0.2438	1.410

and the calculated values for the admission gas of each series of tests was found to be:

No. of Series.	Sp. Ht. Const. Press.	Ratio.	Sp. Ht. Const. Vol.
15	0.0884	1.42	0.0625
22	0.0886	1.40	0.0634

For the expression of the engine's efficiency three quantities of energy were used—the quantity of heat delivered to the engine per minute; the quantity of this heat available for performing work, under the limit of the engine's compression—range; and the quantity of energy actually developed as work in the cylinder. All were expressed in British thermal units per minute. The first was calculated from observed quantity and composition of gas; the second was calculated from thermodynamic principles; and the third was directly observed. From these the efficiencies are defined as—

$$\text{Thermodynamic efficiency} = \frac{\text{Actual work done.}}{\text{Total heat supplied.}}$$

$$\text{Cylinder efficiency} = \frac{\text{Actual work done.}}{\text{Work theoretically available.}}$$

Selected Results

No. of Test	Indic. horse power.	Cu. ft. gas per I. H. P. per hour	Thermo-dynamic efficiency.	Cylinder efficiency.	Coal per I. H. P. per hour.
15 A	72.4	81.8	24.1	54.9	2.03
15 B	66.5	86.4	22.8	52.9	2.14
15 C	63.8	90.0	21.9	50.7	2.23
22 A	59.6	89.3	20.6	49.6	1.81
22 B	60.5	81.9	22.4	54.3	1.65
22 C	66.7	86.8	21.2	51.2	1.75
22 D	64.4	84.0	21.9	52.8	1.70
22 E	75.2	86.5	21.5	62.0	1.73
22 F	61.5	88.0	20.9	50.4	1.78

The coal-rate per I. H. P. hour was calculated from the known quantities of carbon in the gas and in the coal. The percentage of the latter was found to be in Tests No. 15, 80.3 per cent.; in Tests No. 22, 82.4 per cent.

Heat Account.

No. of Test.	Heat received by engine.	Heat converted into work.	Heat lost to jacket-water.	Heat lost in exhaust, radiation.
15 A	12,720	3,074	2,824	6,822
15 B	12,380	2,820	2,870	6,690
15 C	12,380	2,704	3,275	6,401
22 A	12,280	2,528	2,765	6,987
22 B	11,420	2,562	2,716	6,142
22 C	13,320	2,825	2,352	8,143
22 D	12,490	2,732	2,620	7,138
22 E	14,820	3,190	2,530	9,200
22 F	12,940	2,605	3,024	6,861

Conclusions.

The indicator cards showed a great variation in the power developed by the engine for each explosion. This ought not to be the case, as the engine is a scavenging one, and the conditions in the cylinder should be the same at each explosion.

The engine would have, as a general thing, several explosions in succession, and would then miss two or three. It was a noticable fact that the heaviest explosions came immediately after the intervals of missing, and that the explosions grew weaker toward the end of each series of explosions.

This was undoubtedly due to imperfect scavenging, as this would leave more and more of the burnt gases in the cylinder toward the end of each series of explosions. Each interval of missing would thoroughly clean out the cylinder with fresh air, as the air-valve opens every other revolution.

Entropy-temperature Diagram.—English Units, Absolute

The imperfect scavenging was due to two muffle boxes on the top of the exhaust pipe. These were put on to deaden the sound of the exhaust, as before it was done the sound could be heard for miles. These

*An abstract of the graduating thesis of Mr. E. H. Brown, '98, of the Worcester Polytechnic Institute, Worcester, Mass. The introduction, description of the plant and tests, and the conclusion is in the language of Mr. Brown. Prof. S. A. Reeve has edited the part relating to the entropy-temperature analysis.

It is to be remembered, in connection with this test, that, owing to lack of time and experience on the part of the experimenters and of money available for the work, it was not intended as an exhaustive investigation, but rather as an exercise in carrying accurate determination as far toward the support of the engineering judgment as the limitations of actual conditions may happen to allow.

†The producer, however, is not a genuine Dowson, but one of local manufacture.

muffle boxes must retard the gases in the exhaust pipe, and so the current of air which is supposed to be drawn through the cylinder just before the exhaust valve closes. This would stop the perfect cleaning out of the cylinder each time, and so render the scavenging imperfect.

From the results of the tests I found the engine to be consuming, on an average, 86 cu. ft. of gas per I H P per hour, or 1.85 lbs. of anthracite coal in the same time. . . . In finding the coal consumption no account was taken of the boiler for supplying the steam, as we had no means of finding the total amount of gas produced. The gas used by the engine was only a small portion of this, so that the coal consumption of the engine would probably be only slightly increased by taking this boiler into account. The high coal rate is probably due to the poor generator used, which is not very efficient.

[This low efficiency is in part to be attributed to insufficient load on the generator, which is not only too large for the engine, but too large for the additional work imposed in the heating of a number of metallurgical furnaces.—Ed.]

Entropy-temperature Analysis.

The actual entropy-temperature diagram traced by the engine is reproduced herewith. The full diagram is the theoretically perfect, the broken card is from one of the more powerful explosions, such as usually occurred after several impulses had been missed, and the broken and dotted card is from one of the more normal impulses, such as usually occurred when the preceding cycle had contained an explosion. In analyzing the losses of heat and charging them up to their respective causes the loss of heat available for work from limitation of temperature range (i. e., all heat area lying above the level of the topmost point of the actual card or above a horizontal line through the points S and S') was charged to dilution of the charge with burnt gases; the loss of heat area lying to the right of the actual card and below the former item was charged to jacket influence. Whether or not this is right must be left to the judgment of the individual reader; but to aid his judgment the following relations may be pointed out:

Distribution of heat. Test 22 B.	From analysis of entropy-temperature diagram. From card No. 1.		From card No. 4		From direct measurement.	
Total heat supplied	....	211.3	...	211.3	...	211 3
Heat available for work	87.5		87.5		....	
Exhaust (by difference)	123.8	211 3	123.8	211.3	....	211 3
Heat converted into work	80.2		36.3		47.4	
Loss of heat due to poverty of mixture.	14 2(?)		30.5 (?)			
Loss of heat to jacket water	39.6		74.1		50.3	
Exhaust (by difference)	77.3(?)	211.3	63.5(?)	211.3	113.7	211.3

In searching for the proper method of analysis of the losses revealed by the diagram, by checking with what can be known from actual measurement, it is evident that the above plan is not logical. Not only are the exhaust heats too small by this method, but Card No. 1, which is a pure-air card and should show very little loss due to dilution, shows considerable. This inconsistency is pointed out because of the frequent advocacy of the argument that the use of the water jacket is a source of loss of temperature only, and not of efficiency.

While the evidence at hand is too slight to serve as more than illustration, it should be pointed out that if we reduce the area of the theoretic card A B C D by the amount of heat actually known to have gone to the jacket water, which is represented by the area b B C c, we find that Card No. 1 very nearly fills the remaining theoretically available area, except for such minor losses as might be attributed to leakage, air radiation, etc. This is what was to have been expected, since Card No. 1 is not expected to show other large losses than to jacket and exhaust; this, too, leaves us justified in charging the chief differences in area between Cards 1 and 2 to the chief difference in the individual cycles which they represent—the presence of burnt gases in the clearance volume.

So far, the proposition remains supported that, while the entire general temperature level of the Otto cycle might be lowered with gain in efficiency rather than loss, yet if upper temperatures be lowered by pure abstraction of heat, as is the method of the water jacket, an inevitable loss ensues and one which is of the heaviest incurred in gas-engine operation on the Otto cycle.

Attention might also be called to the reversed curve in the expansion line of both diagrams, representing a phenomenon similar to the condensation-and-re-evaporation curve always present in similar diagrams from the steam-engine.

Baldwin Locomotive for China

The engraving given herewith is from a photograph showing a Vauclain four-cylinder compound locomotive, with six driving wheels coupled, recently built by the Baldwin Locomotive Works, Philadelphia, Pa., for the Chinese Eastern Railroad.

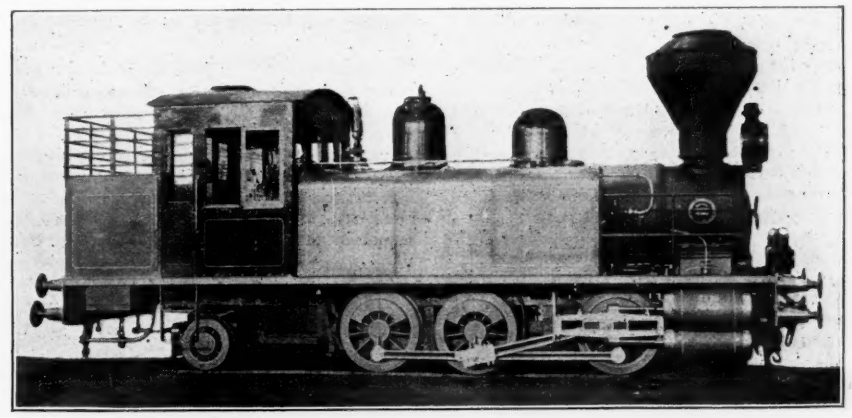
This engine is designed for freight service and the principal dimensions are as follows:

Type	Mogul.
Gage	5 ft.
Fuel	Wood.
Weight on drivers	85,500 lbs.
" " truck wheels	14,500 lbs.
" total	100,000 lbs.
Wheel base, total, of engine	17 ft. 2 in.
" " driving	9 ft. 8 in.
Heating surface, firebox	84.8 sq. ft.
" " tubes	716.9 sq. ft.
" " total	801.7 sq. ft.
Grate area	12.4 sq. ft.
Drivers, number	6
" diameter	40½ in.
Truck wheels, diameter	26 in.
Journals, driving axle, size	6½ in. x 8 in.
" truck " "	4¼ x 7½ in.
Cylinders, diameter	H. P., 10 in.; L. P., 17 in.
Piston, stroke	22 in.
Valves	Balanced piston.
Boiler, working steam pressure	180 lbs.
" thickness of material in barrel	7/16 in. and ¼ in.
" diameter of barrel	44 in.
Firebox, length	49 in.
" width	36½ in.
" depth	63¾ in.
" material	Copper.
" thickness of sheets	5/8 in.
" " of tube sheet	5/8 and 1⅛ in.
Tubes, number	114
" outside diameter	2 in.
" length over sheets	12 ft. 2 in.
Tank capacity for water, gallons	1,600

Train Resistances on Straight and Curved Tracks.*

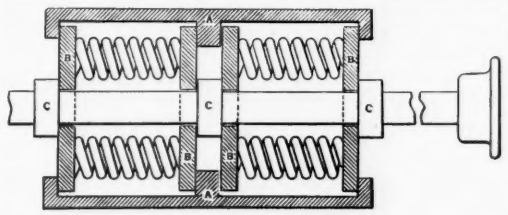
By Prof. Frank C. Wagner.

In connection with some locomotive tests† made by four of the students of the Rose Polytechnic Institute, Terre Haute, Ind., upon the South and North Division of the Louisville & Nashville last May some interesting data were obtained upon train resistances. A dynamometer car loaned for the tests by the Chicago, Milwaukee & St. Paul was placed between the tender and the train and gave a continuous record of the draw-bar pull. The paper upon which the record was made was driven by means of suitable gearing from the car axle in such a manner that one inch travel of the paper corresponded to 100 ft. travel of the train.



Baldwin Four-Cylinder Locomotive for the Chinese Eastern Railroad.

The draw-bar was fitted with three collars, C, arranged as in the accompanying drawing. Four bars, B, were fitted loosely upon the draw-bar, and were guided and limited in their motion by the framework, A, which was rigidly attached to the car. Four springs were inserted between the bars as shown, making a snug fit. The springs were thus thrown into compression for either a pull or a push upon the draw-bar. A lever which multiplied the motion of the draw-bar two and one-half times extended up into the car and moved the sliding bar which carried the recording pen. The dynamometer may be used with only one pair of springs, if desired.



Draw-bar for Train Resistance Tests.

In addition to the dynamometer pen there were several other pens worked by electromagnets. One of these was operated by a chronometer which recorded five-second intervals, thereby furnishing an accurate record of the speed of the train. Another was operated by a push-button pressed by an observer as each mile post was passed. The number of the mile post and the time of passing were marked on the record sheet, so that the location of any portion of the record could easily be ascertained.

To obtain the track resistance from the dynamometer record necessitated certain calculations described later. The results were calculated by Mr. J. M. Lansden, Jr., as a portion of his graduation thesis. All of the results were obtained upon a section of the road which had recently been surveyed, so that the grades were accurately known. The curvature of the track was also measured, but not with the same accuracy as the grade.

In each calculation a piece of track was selected which had a uniform grade, and if on a curve, where the curvature was uniform. Two positions were located upon the record sheet, one where the train was all upon the piece of track selected, just entering, and the other where the dynamometer car was just leaving. The area between the curve traced by the dynamometer pen and the zero line, which was traced by a fixed pen, was measured by a planimeter and the average draw-bar pull found. The force required to overcome gravity was readily determined from the known weight of the train and the grade. The force required to accelerate the train was found as follows: From the record sheet the velocity of the train at the beginning and the end of the portion selected was easily found by measuring the distance between the consecutive five-second marks. The time occupied was determined by cutting the number of five-second marks upon the portion of record used. The accelerating force required to produce this change of velocity in the given time was found by multiplying the change in velocity by the mass of the train and dividing by the time occupied. In some instances the acceleration was negative. The force required to overcome air resistance was neglected, as the velocities were relatively small. If the force required to overcome gravity and the accelerating force be both subtracted from the total draw-bar pull the remainder will represent the frictional resistance to the motion of the train. Also, deducting the average frictional resistance on a straight track from the average for a curve gives the flange resistance. During all of the tests the rails were perfectly dry.

The scale of the springs in pairs had been determined by the owners of the car. During the tests two pairs of springs, acting together, were used. The force corresponding to any deflection of the two sets of springs was taken as the sum of the forces required to produce the same deflection in the two sets tested separately. This involves the assumption that the two sets of springs bear equally, and that neither is in sensible compression at the zero. No means were at hand to test the springs in position, so that whatever uncertainty is due to these conditions attaches also to the results obtained. It is believed, however, that the error in the calibration of the springs as used cannot be large. The following table gives the results obtained:

Table of Results.

Date of test.	Section of track	Av. speed, miles per hour.	Dynamometer pull.	Force overcoming gravity.	Accelerating force.	Frictional resistance.	Nature of track.
			Lbs.	Lbs.	Lbs.	Lbs.	
May 30....	A	11.2	18,000	15,575	−1,246	3,671	Straight
" "	B	10.2	21,300	15,201	+2,058	4 041	"
" "	C	11.6	20,000	15,325	+1,20	3,474	"
" "	D	21.2	9,250	0	+5,820	3,430	"
" "	E	11.6	16,800	16,222	−4,049	4.627	Curved
" "	F	13.6	18,000	15,699	−2,483	4,784	"
" "	G	11.6	18,000	14,453	−776	4,323	"
May 31...	B	12.3	19 900	15,274	0	4,626	Straight
" "	C	10.9	20,400	15,400	+1,548	3,452	"
" "	F	9.5	23,000	15,775	+1,725	5,540	Curved
" "	G	13.0	19,100	14,523	0	4,577	"

Averaging the results for each day and for each kind of track gives the following:

Date of test	Weight of train.	Number of cars.	Frictional resistance, straight track.	Frictional resistance, curved track.	Flange resistance.	Speed, miles per hour.
	Tons.		Lbs.	Lbs.	Lbs.	
May 30	623	28	3,654	4,578	924	13
May 31..	626	26	4,039	5,038	999	11.4

The curvature of Section E is 6 degs. 15 mins. right, Section F 6 degs. 30 mins. left, and Section G 6 degs. 30 mins. left; consequently, it is proper to average the results as applying to a 6½-deg. curve.

*From a paper presented before Section D of the American Association for the Advancement of Science, at the Boston meeting.

†Published in the Railroad Gazette, August 12, page 576.

Averaging the results for the two days gives a frictional resistance of 6.2 lbs. per ton at an average speed of 12.9 miles per hour, and a flange resistance of 1.5 lbs. per ton for a 6½-deg. curve at a speed of 11.8 miles per hour.

The J. A. Fay & Co. New Flooring Machines.

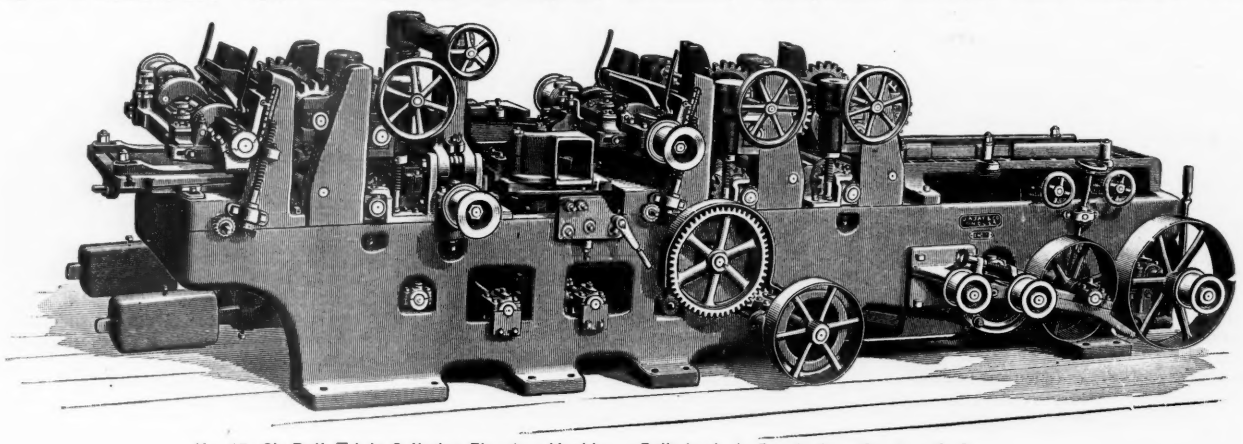
The accompanying illustration shows the No. 17 6-roll triple cylinder "lightning" flooring machine which J. A. Fay & Co., of Cincinnati, O., has just brought out. This machine is made in two sizes and designed to plane four sides of 6-in. plank 10 and 15 in. wide respectively. The frame is massive and strongly braced to resist all strains and vibrations. The heavy girts are so placed as to come under the working parts of the machine, where there is the greatest resistance.

There are three cylinders, made from solid steel forgings. Four faces are slotted to receive two of the four knives and the chip breaking lips for use on cross-grained lumber. The first or main upper cylinder is mounted in a heavy yoked frame, has journals 2¼ in. in diameter, and runs in self-oiling bearings 10½ in. long. It has double-flanged pulleys close to bearings on each end, fitted on taper bearings, secured with wrought nuts. The cylinder-raising screws are outside of the frame, and are fitted with ball-bearings and a device for quickly taking up all lost motion in the screw caused by wear of the threads. The lower cylinder is mounted in a heavy yoked frame, has 2¼ in. journals that run in self-oiling bearings 10½ in. long, and is vertically adjustable at each end. It is driven by flange pulleys at each end. The second upper cylinder is placed at the feeding-out end of the machine, and is intended for a light or skimming cut, and made so as to revolve at a much higher rate of speed than the other cylinders. The journals are 1¾ in. in diameter and run in yoked bearings 10½ in. long. It is single belted and driven from the first upper cylinder.

The feed is made up of six large rolls 8 in. in diameter, each driven by gears and placed on a shaft extending through the machine. The expansion gears on the feed rails are inside the frame and run in bearings. The screws for raising the rolls do not revolve, the rolls being mounted in sleeve housings that travel on the screws. This makes the roll adjustment very easy, as the pressure weights do not have to be lifted. All roll boxes are long and large in diameter. The feed-out roll is covered and provided with scrapers. The weight levers are inside the frame and move with perfect freedom. Three speeds of feed are furnished, viz., 30, 45 and 60 ft. per minute. The feed is under instant and positive control of the operator by means of a lever engaging a friction ring.

The pressure bar directly in front of the upper cylinder is adjustable to and from the cut and has a chilled toe reducing the wear to a minimum. The bars before and behind the lower cylinder are adjustable to and from the cut and are vertically adjustable for varying depths of cut. The bar over the lower cylinder can be instantly swung over from either side by simply loosening one nut, while the bars before and after the second upper cylinder are adjustable to and from the cut. The continuous pressure bar extends over the matching works with independent adjustment and can be quickly thrown out of the way to give access to the heads.

The arbors of the matching machinery are made of 1¾ in. steel rods. The top plate of each matcher is detached from the main casting. Shaving hoods are provided which can be swung out of the way to give access to the heads.



No. 17. Six-Roll, Triple-Cylinder Flooring Machine.—Built by J. A. Fay & Co., Cincinnati, O.

Apparatus and Methods Used in Testing Road Building Stone.*

Early in the history of the state highway work in Massachusetts the Highway Commission recognized the value of having certain tests made on the stones used in building macadam roads, and, with this in view the Commission secured the services of Mr. L. W. Page, a geologist, who has also a considerable knowledge of mechanics, to conduct such experiments. The experimental work has been carried on in the Engineering Laboratory of Harvard University. The aim of these inquiries has been to determine the nature of the qualities which constitute fitness or unfitness of the different kinds of rocks for use in road making, the effects of diverse methods of treatment used in the process of construction, and the relative value of the bed rocks and gravels which are found in the several parts of the state.

The experiments which have proved most useful thus far are the abrasion and the cementation tests. The machines used in conducting these tests were designed by Mr. Page, under the direction of the Commission, the abrasion machine being modeled after the Devâl machine, such as is used in similar tests at the National School of Roads and Bridges of France.

The stones employed for making the abrasion tests with the Deval machine are of such sizes as will pass through a screen with a 2½-in. mesh and not through a screen with a ½-in. mesh. In making a test, 11 lbs. of the stone, previously cleansed, are placed in the cylinder; the air-tight cover is then screwed on, and the cylinder rotated at the rate of 2,000 revolutions an hour. The rotation of the cylinder throws the fragments of stone from one end of the cylinder to the other twice in each revolution. At the end of five hours, or 10,000 revolutions, the machine is stopped, the cylinder opened and the contents emptied into a basin. The cylinder and the cover are carefully washed, and the water used is poured into a basin. Each stone is then washed and brushed under the water, and is thus cleansed from the adhering dust, which remains in the water as a sediment. After it is dry, the detritus is emptied into an automatic sieve which separates that below $\frac{1}{100}$ of an inch from that above. The per cent. of the $\frac{1}{16}$ in. dust may be taken as a coefficient of wear, or the coefficient adopted by the French School of Roads and Bridges may be adopted by the formula

$$\text{Coefficient of wear} = \frac{400}{w}$$

where w is the weight in grammes of the detritus, less than $\frac{1}{16}$ of an inch in diameter obtained per kilogramme of stone.

Great care is taken to make the tests on all specimens under precisely similar conditions, so that all results are comparable. The results of about 170 tests with the Deval machine can be seen in the 1898 report of the Massachusetts Highway Commission, pages 63 to 68. The results of some of the tests on the more common rocks are given below:

Kind of Stone.	Highest result. Coeff. of wear.*	Highest result. Per cent. of wear.	Lowest result. Coeff. of wear.*	Lowest result. Per cent. of wear.
Diabase (trap)	30.40	1.31	9.23	4.31
Granite	21.16	1.90	8.41	4.76
Felsite	19.91	2.01	12.30	3.25
Gneiss	23.02	1.73	5.01	7.98
Limestone	17.20	2.33	6.31	6.34
Schist	12.52	3.19	4.87	8.20
Quartze	20.34	1.97	9.07	4.41
Field stone (erratics)	19.19	2.08	5.43	7.50

*On the French system.

The machine for testing the cementing value of stone consists of a 2.2 lb. hammer, arranged like the hammer of a pile driver on two vertical guides. The hammer works automatically, and can be dropped from any desired height upon a plunger under which the briquette to be tested is placed. This plunger is also held in two guides and attached to it is a lever, pivoted at one-sixth of its length from the plunger, and carrying a pencil at its free end. The pencil has a vertical parallel movement five times as great as that of the plunger, and its movement is registered on a drum against which the pencil presses. The drum rotates through a small angle at each stroke of the hammer; thus an automatic diagram is taken of the behavior of the briquette throughout the whole test. The point brought out by this machine is the fact that, when the hammer falls on the plunger, if the material beneath it can withstand the blow, the plunger recovers from the downward thrust given it by the hammer; if not, the plunger stays at the point to which it is driven. In this way the number of blows previous to the critical blow, which destroys the bond of cementation, are accurately recorded on the drum.

The present machine used for this work is 2 ft. square and 9 ft. high. A new machine is now under construction, which will be less than half the height of the old one, the difference in height being due to a simpler and more efficient gearing.

The briquettes for the cementation test are made by reducing the stone to a dust that will pass through a sieve of $\frac{1}{100}$ of an inch mesh. The powder is then put into a slightly tapered steel die of circular section, about 1.33 in. in diameter and .98 in. in height, mixed with water and subjected to a pressure of 4,400 lbs. The resulting briquette is then put aside for at least one week, so that it may thoroughly dry.

As the greater portion of the time of the employees in the laboratory has been devoted to the field work and the abrasion tests, the work of determining the cementing values of the fines of the stone has been somewhat neglected, and the results obtained from such tests thus far do not warrant their publication at the present time. It is hoped that before long work may be resumed on these tests.

The Commission has also in view the study of the cementing properties of the various kinds of gravel found in the state. It is hoped that an effective size of gravel may be established, and the best method of holding the gravel in place on the roads by some binding material which will not only stand the wear of traffic but which will also resist the action of the elements and not rot when the frost comes out of the ground in the spring.

*From a report by T. C. Mendenhall, W. E. McClintock and C. W. Ross, Highway Commissioners of Mass.

Society for the Promotion of Engineering Education.

The Boston meeting of the Society for the Promotion of Engineering Education was well attended and the discussions were up to the high standard which has characterized those of previous meetings. The subjects taken up, while not in the field of work pursued by many of our readers, should, nevertheless, be of interest to all highly trained engineers, inasmuch as they determine largely the conduct of technical schools, and indirectly the standing and influence of the engineering profession.

Officers Elected.

The following officers for the ensuing year were elected at the meeting last week: President, T. C. Mendenhall, Worcester Polytechnic Institute; Vice-Presidents, C. F. Allen, Massachusetts Institute of Technology, and H. W. Sprangler, University of Pennsylvania; Secretary, Albert Kingsbury, New Hampshire College of Agriculture and Mechanic Arts; Treasurer, J. J. Flather, University of Minnesota. The following were elected members of the Council, to serve for three years: T. M. Dunn, M. A. Howe, I. N. Hollis, G. Lanza, P. C. Ricketts, R. G. Thomas and C. M. Woodward.

Papers and Discussions.

We take up the report of the meeting from the session held Friday morning, brief abstracts of the papers for Thursday being published last week. These included President Johnson's address and the papers of Professors Lanza, Haynes, Smith and Thurston.

The discussion on Prof. Thurston's paper covered broadly the subject of the proper place of engineering courses in colleges. The eleven questions in the sub-topics as published last week, were considered in both the light of experience and expediency. Prof. C. M. Woodward took the ground that the needs of to-day were for a liberal training, or, as he put it, "a good solid main trunk." He took exceptions to the statement that the school should bend to the popular opinion and local requirements. The school ought to take the lead and mould public opinion in a community. Mr. Kent raised the question as to the place that the engineering school had in education; should it be adapted to the needs of a community where it is located, or should it, like other professions, attempt to turn out highly trained specialists, consequently limiting the number that will take the prescribed course? Further discussion laid emphasis on the fact that the location must govern the nature of the course. The two sub-topics which Dr. Thurston and President Johnson suggested might be most profitably considered were discussed somewhat pro and con. The first of these was regarding the elimination of all undergraduate work, and the second related to the question of having the work controlled by a body, as the Board of Regents of the State of New York. It is probable that these questions will continue to come up at future meetings.

The report of the Committee on Uniformity of Symbols, of which Dr. T. C. Mendenhall was Chairman, was then read. The report reviewed the work already done and made certain recommendations, but the entire matter was laid on the table.

Prof. J. J. Whitmore, of the Alabama Polytechnic

Institute, then discussed "Some Phases of Engineering Education in the South," of which the following is an abstract:

The difficulties to be met by engineering education in the South are in some respects peculiar to the section, and in others common to all sections. The problem of preliminary preparation is one, the solution of which all can share. In some of the Southern states, however, it is more trying than elsewhere. This problem, complicated by the demand for a multiplicity of subjects other than engineering subjects, makes the arrangement of a satisfactory course of study difficult.

No college ever yet had as much money as it needed, but in the South the lack of funds is more keenly felt than in other sections, for the following reasons:

(1) The necessity of separate institutions for white and for colored students. The funds that might support one are insufficient for two.

(2) The absence of personal bequests and donations to white colleges in the South.

(3) The fact that lower fees are charged the students than in other sections of the country.

From the statistics of nine colleges in each section, selected to be as nearly representative as possible, the income per student for the northern colleges averages $242, and for the southern colleges $172. The average number of students per instructor in the northern colleges is 10.7, and in the southern colleges 12. The greatest income per student is $440, and the least, $64. The smallest number of students per instructor is 6.2, and the greatest, 15.6. These statistics are based on the total attendance, and while not an absolute index of the engineering work, should give relatively the conditions in the two sections.

The inertia of the old prejudice of practice against theory is still an important factor in southern industrial management. This makes it difficult for our students to get positions which they are qualified to fill, without first undergoing a year or two of drudgery from which they secure little, if any, benefit.

The conditions, however, improve from year to year, and the prospect for the future is far from discouraging.

The discussion on the above paper brought forth the opinion that the courses in electricity should be taught by a professor of engineering in preference to a professor whose training has been entirely in physics. Prof. H. Wade Hibbard showed what importance electrical engineering had in the course of railroad mechanical engineering at the University of Minnesota, and which will be followed out in the main at Cornell University. Prof. Hibbard stated that as much time was given to the laboratory work in electricity in this course during the senior year as is required in the same line of work by students for the E. E. degree. Regarding the relations between electric and steam roads, he stated that it is to the discredit of the steam railroads that the traffic has been taken from them by the electric roads. He cited the instance that between Minneapolis and St. Paul, a dstance of about nine miles from center to center, there were six steam roads, and the passenger traffic could be handled better by any one of these than was now done by the electric roads between the cities. Exception was taken to Prof. Hibbard's statement that electric cars could be used to advantage where railroads had to do considerable freight business.

The discussion by other members emphasized the importance of a closer relationship in the instruction of the different branches of engineering. It was believed by one of the members that the electrical engineer gets more mechanical engineering than vice versa. In the Lawrence Scientific School the mechanical engineers are required to take nine hours a week for a year in electrical engineering. The whole question, as summed up by Prof. Marburg, was a question between desirability and necessity.

Prof. Frederick R. Dunlap discussed the interesting topic entitled "A Course in Industrial Chemistry for Technical Schools." The author of the paper first showed that the problems, while relating to questions of pure science, have great importance, the main object in the solution of industrial problems being to make the theoretical apply to some useful end. The author reviewed the entire subject, reference particularly being made to the importance given to this subject in Germany, where the engineering industries have increased 72 per cent. since the Franco-Prussian war, while the agricultural population has decreased since 1882 from 40 to 35 per cent. To-day Germany alone has 4,000 technical chemists, while those interested in chemistry as a pure science will not exceed 200. The number of her technical chemists have increased three-fold during the last quarter of a century. This shows that the Germans have learned the importance of the union of pure science and industry.

The author then outlines the course in industrial chemistry at the Worcester Polytechnical Institute, expressing the belief that this course, while not perfect, has accomplished much for the graduates.

In connection with this course the student has access to a museum, founded for the purpose of showing the products, bi-products or waste-products of the various factories, as well as the various stages in any process of manufacture. In the course sulphur is first taken up, sulphuric acid, salt-cake, soda ash and other allied subjects which would naturally be included in a lecture course relating to these topics are all considered.

Laboratory work is made as practical as possible, and besides the routine work, instruction is given in the manufacture of chemicals, the importance of this special department of the work being shown by the increasing demand for technical chemists, particularly in Massachusetts and the New England states.

The importance of teaching industrial chemistry was alluded to by President Johnson, and in the discussion attention was called to the requirements in the large sugar plants in the South, where at present chemists without engineering knowledge and skill were being superseded by men of chemical and engineering knowledge. It has been found necessary to obtain a man who can design a large sugar plant, so that when completed there will be a saving because of good engineering features of the design, as well as a saving due to chemical considerations. Reference was made to the fact that Cornell is making arrangements for a more extended course in industrial chemistry.

"A Laboratory Apparatus for Impact Experiments," by W. K. Hatt of Purdue University, was then read.

Longitudinal impact is produced by the fall of an 845-lb. cast-iron weight or hammer on a specimen of steel rod. The rod is held at each end by conical wedges fitting in steel bushing pieces. The hammer is fixed to the lower end of the specimen, the lower bushing bearing against a shoulder made in the core of the hammer.

The combination of upper bushing, rod and hammer is lifted to a desired height and then released. The upper bushing is caught in the descent by cross pieces fixed to the uprights of the apparatus, and rupture of the specimen results. The circumstances of the impact are recorded on a revolving drum by a pencil attached to the hammer. The resulting curve furnishes data from which the ultimate resilience, elongation, time of impact, etc., are obtained.

The resilience is worked up in two ways: (1) By the application of the principle of work and energy to the descending weight, and (2) from the load-elongation diagram, whose abscissæ are the elongations of the specimen, and whose ordinates are the corresponding forces, computed from the known mass of the weight and its retardation.

The apparatus illustrates to the student some principles in mechanics and some phenomena of rupture, and may be applied to purposes of research.

On Friday evening Prof. S. A. Reeve took up the subject of "The Direct Study of Thermodynamics." The author briefly referred to the principal considerations that enter into a study of the entropy-temperature analysis, giving some of the advantages especially in gas engine work. It would be unnecessary to repeat what has formerly been published in the Railroad Gazette on this subject, the most recent reference to the entropy-temperature method of analyzing heat engine efficiencies being contained in a paper by Mr. George Richmond, before the A. S. M. E., and published in our issue of Jan. 7, 1898, with comments by Professor Reeve. In his paper last week, Prof. Reeve expressed the belief that a physical and accurate conception of entropy was essential to an intelligent discussion of thermodynamics, and as perfect a conception could be had of entropy as of mass. Those who spoke after the paper had been presented were apparently not able to form this physical conception. Prof. Peabody, while not pretending to understand the entropy-temperature analysis, set forth in defense some of the advantages and the simplicity of the analytical method. Before closing he made an offensive attack on the entropy-temperature method. Prof. Reeve made the statement in reply to certain points that the entropy-temperature diagram represents a law, while the volume pressure diagram represents a fact; hence the former is the natural and the broader basis for all analyses. This was one of if not the most spirited discussions that was listened to, and President Johnson remarked at an interesting period of the defense that it was becoming "really exhilarating."

[On another page in this issue will be found an analysis of a gas engine test, using the entropy-temperature card.]

"The Claims of Sanitary Science to a Place in the Curriculum of Engineering Education," by Prof. W. T. Sedgwick, while somewhat apart from what is usually regarded as a necessary subject to be taken up in engineering courses, was shown to be in many cases one of the most important in some civil engineering courses. Some of the principal topics discussed by Prof. Sedgwick are included in the following abstract:

Education has been variously defined, but for the biologist it is essentially the higher adaptation of organism to environment. Engineering education is obviously only a special form of adaptation, and whatever subject can materially contribute to the higher adaptation of the young engineer to his profession—his chosen and special environment—has more or less claim to a place in the curriculum of his education. The strength of the claim upon a curriculum already overcrowded depends simply upon the relative efficiency of the subject in contributing to the end in view, and this efficiency being in many cases difficult or even impossible to determine with any accuracy, opinions will differ, and curricula will differ, accordingly, in an entirely natural and probably very wholesome way.

A very great amount of modern engineering is essentially sanitary. Water supply, with its reservoirs, filters, dams, conduits, pipes, pumps, meters; sewerage, with its plumbing, drains, pumps, disposal works, sludge basins, and purification problems; warming and ventilation, with their questions of humidity and conductivity, affecting the health and ill-health of man, as well as questions of the purity of air in respect to gases and micro-organisms; the construction of halls and buildings, of factories and tunnels, to be used by human beings, subject to infection, varying in lighting and air space; all of these have either their origin or their proper control in modern sanitary science.

It seems to the writer proper and wise, therefore, to provide a short course of instruction in the fundamentals of this subject; and such a course, consisting of fifteen lectures, with demonstrations, has now for some years been given by him with much success to civil engineers, architects and others, in the Massachusetts Institute of Technology. A comprehensive survey of the course and its results appears in the complete paper.

In commenting on the subject, Prof. Merriman gave the following figures, which show the increase in the medium ages of persons in the United States from 1850. At that time this age was 18.6; in 1860, 19.3; in 1870, 20.9; in 1890, 22, and in 1900 it will probably be 23.1. Prof. Merriman emphasized the importance of this subject in engineering courses.

Reference was then made to the course in railroad sanitation at Purdue in connection with the cars and stations of railroads. It was stated that the Pennsylvania Railroad spends over $10,000 a year in giving good drinking water to the employees. Reference was also made to the requirement, especially in the West, which permitted only men with the degree of M. D. to serve on the State Board of Health. In many cases sanitary engineers would be much more serviceable and could accomplish much in the line of improvement in design which could not possibly be done by a medical man without the engineering instinct and training.

The subject of "Undergraduate Thesis Work," by Prof. Edgar Marburg, was presented mainly for the purpose of eliciting discussion. Prof. Marburg expressed the following views:

The thesis is not regarded as a test of the acquirements or capabilities of the students. It is recognized rather for its value in affording more advanced and specialized training. The general character of the subject should be determined by the student's predilection, or by the nature of his prospective employment, or better, by both. Its choice should, therefore, rest with the student. The subject itself should always be selected in consultation with the instructor.

In civil engineering, a design or an occasional résumé requiring extended reading and study is preferable, generally speaking, to such so-called original experimental work as the average undergraduate is capable of. In a design, an excessive amount of routine work can be avoided; in an experimental subject, this is usually impracticable. The value of the former, educationally, is at least as great; as a means of professional training, usually much greater. In an experimental thesis there is more danger that the best interests of the student will not be held strictly in view.

The curriculum requires careful adjustment. Assuming a two-term year, courses most essential to thesis work should be completed during the first term. there should be less prescribed work for the second The choice of subject and certain preliminaries should be disposed of during the first term; weekly periods should be assigned to thesis work throughout the second. The practice of not appointing fixed hours is deprecated.

The student should be left to his own resources within reasonable limits only. The work throughout should be under the conscientious supervision of the instructor. The undergraduate requires and should receive certain assistance that reference books do not and cannot supply.

An excellent suggestion was made in the discussion following this paper to the practice which has worked to advantage in one or two institutions which require the undergraduate to prepare what is termed a "summer memoir." These essays are intended to cover principally the results of investigation by the student of some engineering work, either from his practical experience or from interviews with engineers. Prof. Jackson was strongly of the opinion that the thesis work should be entirely under the direction of the department, the same as any undergraduate work; and further, that a fixed number of hours should be required on thesis work each week. Prof. F. H. Robinson believed that a wrong impres-

(*Continued on page 613.*)

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns pesent only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Our navy has suddenly become famous again. As after the Civil War all the nations of the earth turned to us for lessons in seamanship and gunnery, in naval architecture and marine engineering and in naval ordnance; so, now, they look to us again for the same lessons. In all this the engineers of our navy will have their place as teachers and examples. Experts will study their deeds in the design, maintenance and working of the vital machinery entrusted to their care, but of that renown which the popular press gives they have yet little share. We were greatly pleased therefore to discover in one of the daily papers an engineer's story of the great voyage of the Oregon and we are glad to reprint the most important parts of it. The reader will find that it is not only a highly intelligent story, but a modest and manly one. He will see there some glimpse of the unwearying zeal, fidelity and care which made it possible for the Oregon to steam 14,000 miles without an hour's delay due to defects of machinery, to arrive at the end fit for instant battle, and when the battle came to astonish everyone by her speed. He will discover, too, that this performance went back to the design, construction and installation of the machinery. This was by far the most striking engineering performance of the war, but no doubt there are many others which, when they become known, will help to show to the world the place of the engineer in modern naval operations and to sweep away the last traces of the old differences between the line and the staff. The standing of the engineer has changed a good deal since, according to Commodore Loring, an old-time commodore wrote, in answer to a question as to the status of persons entrusted with the care of steam engines on ship board: "It would seem that such persons should be exempt from corporal punishment." But there is still a good deal to do, and the engineering journals have yet a duty to perform in making known the part that the engineer must play in the conquest of the earth, not only in peace but in war.

The M. C. B. Coupler.

In our issue of August 12 we printed a paper presented by Mr. Pulaski Leeds, read before the Central Association of Railroad Officers, in which much fault is found with the present standard type of vertical plane coupler, but no suggestions whatever are made as to how these faults are to be overcome. Such a paper might perhaps be expected to come from the chief mechanical officer of the road having the smallest percentage of cars equipped with automatic couplers of any of the important roads.

To summarize, Mr. Leeds would have us believe that a great mistake was made in adopting the vertical plane type of coupler in preference to loose links; that the "vertical plane type was improvidently, if not hastily, adopted," and that "it seems scarcely creditable that this device should have resulted from a careful investigation and consideration of the well-known conditions and requirements of service." These conditions are then stated to be as follows: "First, that the concussion when coming together should be evenly and squarely met on a central line; second, that the pulling strain should be on a central line so as to avoid all tendency to crowd the flange against the rail; third, that the connection should be so flexible that there should be no unnecessary friction at any time or difficulty in coupling on any practicable curve; fourth, that the device should be capable of having its strength increased to meet future requirements of heavier motive power; fifth, that it should be always operative; sixth, that there should be as great uniformity as there was in the link and pin." The M. C. B. coupler is not credited with having a single one of these features.

No doubt the committee of the Officers' Association which has been appointed to investigate this matter will carefully read again the reports and discussions of the coupler question before the M. C. B. Association between the years 1882 and 1888, with which they are, of course, familiar. If Mr. Leeds had thus refreshed his mind he would hardly have written such a paper.

Between the years named the coupler question was considered, with possibly the exception of the question of power brakes, the biggest problem that had ever come before the Association, and instead of a coupler being adopted hastily, the investigation, study and trial of different couplers extended over six or eight years, and the Association during that time was continually criticised for being so slow and deliberate. Something like 4,000 coupler patents had been taken out and the problem was to find out, not which coupler was perfect, but which was open to the least objection. We believe it has never been claimed that the M. C. B. coupler was perfect; only that it was the best available.

The first important step in the evolution of the coupler was the unanimous vote of the Association in 1884 that the proper mechanical principle for any automatic coupler was that it should couple in a vertical plane. It was then considered, and no doubt correctly, that the loose slack of the link and pin type was a feature which had to be eliminated, and the Burlington brake tests demonstrated conclusively that trains could be run more safely without any loose slack.

The report of the M. C. B. Executive Committee in 1887, recommending the adoption of the present type of coupler, clearly stated the problem in a broad way. It suggested wherein certain improvements could be made which would increase the strength of the coupler, but the details, such as knuckles and locks, were wisely left to be developed later. We cannot see how the work of the M. C. B. Association in this matter can be considered hasty.

Some of the requirements which Mr. Leeds lays down for couplers are open to serious objection. No doubt the concussion when cars are brought together should be squarely met, not, however, on the central line of the coupler, as Mr. Leeds specifies, but on the buffers, unless we use something a good deal more efficient than the present draft gear. The coupler as mounted now is not a buffer, and was not meant to be, and it cannot rightly be charged with failure to fulfill conditions it was never designed for and that should never be imposed on it.

The tendency for the pulling forces in certain cases to crowd the flanges against the rail may exist, and in some cases there is difficulty in coupling on sharp curves; but if these defects are serious enough they will no doubt be remedied in the vertical plane coupler.

Few will agree that the present coupler cannot be increased in strength; there is a wide range between the strength of malleable iron and cast steel, and if in addition to the use of better materials the coupler be relieved of the buffing shocks its strength will probably be sufficient for all requirements.

The operative features of the coupler depend chiefly on the design of the knuckle, pin and lock, and the question of standardizing these parts promises to be one of the problems which the M. C. B. Association will have to settle soon. But behind all this is the fact that it is too late to change even if we would. We must live with the M. C. B. coupler, and, if it has defects of detail, the wise man will set about getting them corrected. It is too late in the century to worry about defects of principle.

Annual Reports.

Southern Railway.—The annual report of this company for the year ending June 30 shows much the best results obtained since the organization. The increase in earnings over last year is not so great as on the Rock Island and the Northwestern, for while those roads gained through large grain crops in demand at high prices, that traffic did not benefit the Southern, and the cotton crop, while large, as it promises to be again this year, sold at low prices. Its movement to market, however, brought a larger traffic, and there were also gains in lumber and mine products, the growth in tonnage of coal and coke being especially noticeable, while iron, merchandise, fertilizers, ores and live stock all yielded a considerably larger traffic than in 1897.

The result of the year's operations was a gain in gross earnings of $2,016,300, or 10½ per cent., with expenses enlarged by $1,268,700, or 9½ per cent., leaving an increase in net earnings of $747,630, or 12.7 per cent. The final surplus was more than double the 1897 figure, and equaled $1,007,000, being 1¾ per cent. on the preferred stock now outstanding. This, added to the profit and loss credit, as it stood on June 30, 1897, made this account $2,154,370. The deductions during the year were the 1 per cent. preferred dividend paid last January, calling for $543,000, and $156,418 for sundry charges written off, so that the present profit and loss balance is $1,454,952, or over 2½ per cent. on the preferred shares.

The general results of operations for the last two years follow:

	1898.	1897.	Inc.
Gross earnings	$21,095,839	$19,079,500	$2,016,339
Operating exp. and taxes	14,501,864	13,233,156	1,368,708
Net earnings	$6,593,974	$5,846,344	$747,630
Other income	348,378	286,833	61,545
Interest, etc.	5,862,768	5,612,234	250,533
Other charges	72,571	75,022	*2,451
Total charges	$5,935,339	$5,687,257	$248,083
Surplus	1,007,013	445,920	561,093

*Decrease.

These figures include four months' operations of the Memphis & Charleston, now operated as the Memphis division, 334 miles in length. The report gives a table in which the revenue of the system is adjusted to cover practically the same lines for a series of years, the constant additions to the operated mileage since the company's organization in 1894 making such a table more useful in tracing the changes in revenue than the income accounts, which include roads operated only part of the year, and in the earlier years give figures for a much less mileage than is now operated. This figure is now 5,232 miles, against the 4,392 miles of 1895, an increase of 840 miles. The 1898 revenue figures are higher than those of any year since 1891. The gross and net for each fiscal year of the company since its organization; for 1894, which represents the low ebb of earnings, and for 1891, are given below, the figures being for substantially the same mileage in all the years:

	Gross.	Net.
1898	$20,641,300	$6,485,500
1897	19,079,500	5,846,300
1896	19,082,200	5,639,800
1895	17,959,100	5,168,600
1894	17,548,700	4,358,200
1891	21,241,200	6,678,600

This shows a gain as compared with 1895, the company's first fiscal year, of $2,682,000 in gross, and of $1,317,000 in net, a very substantial progress.

The earnings in 1898, excluding the receipts of the Memphis Division, increased 8 per cent. from freight traffic, and 8.86 per cent. from passenger travel, gross gaining 8.19 per cent. on $1,561,800. Expenses were $922,600 larger, but nearly half of this amount, or $446,986, was for equipment, that expense account increasing 19.8 per cent. Transportation expenses increased 4.9 per cent., and maintenance of way and structures 1½ per cent.

The extensive improvements which have marked the Southern's history from the beginning continued during the year. Over 12,370 tons of 75-lb. rails (107 miles), and about 1,900,000 cross ties were laid in the track. The main line crosstie renewals in the last four years have averaged 1½ million ties. The number of miles ballasted is now 45 per cent. of the total mileage.

A large share of the increased expense of equipment renewals was due to the cost of safety appliances, on which $119,600 was spent during the year. In the past three years $410,000 has been spent for equipping cars and engines with air brakes and couplers, and 54 per cent. of the freight cars are now equipped with air brakes, and 82½ per cent. with automatic couplers. The new equipment of the past year includes 970 freight cars, 23 engines and 11 passenger cars.

The cost of additional equipment ($203,800), was charged to capital, and the cost of replacements to expenses, which was further charged with the cost of all equipment destroyed and not replaced. The total capital charges for improvements and real estate were $471,854, of which the main items were $195,000 for new terminals; $76,700 for passing tracks, and $159,000 for real estate at Atlanta, Washington and other points.

The traffic operations, exclusive of the Memphis Division, show an increase of 649,000 tons, or 8½ per cent. in the tons carried, and of 112⅔ millions, or 8.51 per cent. in the ton miles, while, as before stated, the freight earnings maintained about the same ratio of increase, 8.2 per cent.; the cost of transportation was only 4.9 per cent. above last year's total. The average ton-mile rate fell off slightly, from 9.36 mills to 9.33 mills, and the passenger mile rate was 2.322 cents, against 2.372 cents in 1897. Freight train mile earnings were $1,392, against $1,385 last year.

The changes in the financial accounts during the

year were numerous. The purchase of the Memphis & Charleston called for the issue of $5,083,000 first mortgage 4 per cent. bonds; $1,500,000 second mortgage Memphis Division bonds, and $2,990,400 preferred stock. The old equipment trust notes have been reduced by $142,000 to $202,800, and sinking funds have reduced other equipment bonds by $190,900.

The funded debt of the Southern Railway shows an increase of $20,576,000 during the year, but $12,861,000 of this is accounted for by the transfer of bonds of the Virginia Midland, formerly held in another account. The net increase in the funded debt and outstanding securities of the entire system is $7,637,548, of which $6,583,000 was issued for the Memphis division, and $1,000,000 to conclude the purchase of the Knoxville, Cumberland Gap & Louisville.

Chicago & Eastern Illinois.—This road is one of the important soft coal carriers, and the unfavorable condition of that business was against any very important improvement in the earnings of the company during the year ending June 30, 1898, for which the report is now published. During 2½ months, from July 1 to Sept. 15 last, an extensive coal miners' strike practically suspended the mining of coal throughout the Middle states, and during the rest of the year business was not in a flourishing condition. Despite this the company was able to increase its gross earnings about 7½ per cent., although the gain was mostly absorbed by the larger expenses. The net available income was $455,387, which provided a balance of $10,600 above the dividends paid. These latter included, besides the regular 6 per cent. on the preferred, a first payment of 2½ per cent. on the present comomn shares. The summarized results follow:

	1898.	1897.	Inc.
Gross earnings	$4,221,438	$3,927,610	$293,828
Operating expenses and taxes	2,619,632	2,423,916	195,716
Net earnings	$1,601,806	$1,503,695	$98,111
Other income	166,286	157,712	8,574
Fixed charges	1,312,704	1,243,709	68,995
Net income	$455,387	$417,698	$37,689
Dividends	444,787	289,842	154,945
Balance	$10,600	$127,856	*$117,256

*Decrease.

Freight traffic yielded $264,000, and passenger receipts $32,000 of the increase in gross earnings. Equipment and roadway expenses together account for over half the increase in expenses, the former item gaining 14 per cent. and the latter 16 per cent., or more than three times the increase in cost of conducting transportation, which was 5 per cent. The increase of taxes, 13.6 per cent., is also noticeable. The company pays out in taxes 5 per cent. of its gross receipts, and no less than 32 per cent. of the revenue after the payment of operating and fixed charges.

The tonnage increased during the year 201,707 tons, or 4.4 per cent., while the ton-miles were 47,774 thousand, or 7.8 per cent. higher. The train miles, however, were only 5½ per cent. higher, while the train load, not stated in the report, appears to have increased from 361 tons to the high figure of 369 tons. This is all the more notable because as the coal cars have to be returned empty to the mines the empty car mileage is very large, being in 1898 two-thirds of the total car miles reported. The average train haul was increased from 133.8 miles to 138 miles, and the average ton-mile rate was also slightly higher, being 5.12 mills in 1898, against 5.09 mills last year. The freight train mile earnings were $1.89, against $1.84 in 1897. Considerable improvement work was carried out during the year in relaying rails, replacing trestles and wooden bridges with permanent structures, ballasting the Chicago, Paducah & Memphis, a line acquired during the year, etc.

The financial changes during the year were important. Besides the start in dividends on the common stock the company has issued $1,221,800 of preferred stock, and $1,832,700 common stock to acquire the Chicago, Paducah & Memphis, 122 miles long, between Shelbyville and Marion, Ill. The importance of this acquisition is that by extending the road from Marion to the Mississippi, the company will secure a southwestern outlet. Of the new stock, however, all except $1,000,000 of the preferred is still held in the treasury. The company has charged off $300,000 for depreciation of equipment carried on the books at cost since the consolidation in 1887. The only floating debt, beyond $406,000 of current pay rolls, vouchers, etc., is $399,000 car trusts of the Chicago, Paducah & Memphis.

The eastbound Lake Shore limited train, consisting of a locomotive and six cars, collided with six freight cars loaded with ice on Aug. 17, about a mile west of La Porte, Ind. The freight cars had been run out on to the main track from the Washington Ice Co.'s houses, and whether a flagman had not been sent out, or whether the engineman of the passenger train failed to see the signal, we are not informed. But it seems that the limited was running between 40 and 50 miles an hour when it struck the ice cars. Three of these were totally wrecked, but the other three can be repaired. The locomotive was damaged to the extent of about $300, the pilot, headlight and front end trimmings being the only parts which will have to be replaced. The tender was pushed up over the platform of the buffet car, and broke through the front end of the car body; the platform timbers of this car were not broken, and the cost of repairs will probably amount to about $350. None of the other cars in the passenger train were injured, and as all have wooden underframes and platforms the construction must be exceptionally strong. The engineman was pretty badly injured, while the conductor, one brakeman and three passengers were slightly hurt. With the exception of the front end of the buffet car, the train was fitted throughout with wide vestibules, and it cannot but be observed that there was no telescoping throughout the train, nor any serious crushing, excepting that at the front end An equally fortunate result might have been experienced if there had been no vestibules; no one can tell; but the circumstances of the accident afford one more illustration of the value of the vestibule as an effective preventive of damage to car bodies in collisions. That such a collision can occur without loss of life to those in the train again strikingly demonstrates the marked progress that has been made in passenger-car building, as regards strength, within the past few years

A press dispatch from Washington says that the War Department has established a "division of transportation," to have charge of all the rail and water transportation of the army. The Chief of the division is Colonel F. J. Hecker, and the Deputy Chief is Colonel Charles Bird. Colonel Bird is an officer of the Regular Army. Colonel Hecker is said to be a wealthy business man and an associate of Secretary Alger in lumber interests. The press despatch states that during the war the Government has paid to the railroads, for the transportation of troops, three cents a mile and that the new bureau will bring the railroads to more reasonable terms. This statement, in the light of what we printed last week about a rate from Chicago to New York of about one-eighth of three cents would seem to be subject to some modification. We do not know but that three cents per mile per capita may have been paid for some military transportation, for the large quantity of baggage carried by some of the expeditions, and the emergency features of the service, may have made that rate reasonable; but from the rates given in a number of published contracts, and from what we have heard elsewhere, we should estimate that the average rate paid by the Government for carrying troops had not been over a cent and a half.

The new ordinance requiring the Chicago street railroads to equip their cars with fenders is to go into effect Sept. 1. The Chicago Police Department has compiled a list of the people struck by cars between Dec. 1, 1897, when the former ordinance was to have gone into effect, and Aug. 18 last. The record shows that in this time there were 619 persons struck by cars, of which number 62 died of their injuries; it is stated that most of the accidents happened to children between 4 and 13 years of age. We are informed by an officer of one of the Chicago street railroads that of over 70 different styles of fenders which have been presented by inventors not one of the lot promises to do what is claimed for it, but that the fenders will really introduce a new danger. The position taken by the street railroads is that by increasing the length of the car four or five feet by the addition of the fender it will catch a lot of people who otherwise would have time to get out of the way, while the fender will not lessen the chance of serious injury for those who get caught.

NEW PUBLICATIONS.

Practice and Theory of the Injector. Second Edition. By Strickland L. Kneass, C. E., Mem. Am. Soc. M. E.,etc. Octavo, cloth, 161 pages, 48 engravings. New York: John Wiley & Sons. 1898.

In the second edition of this work the text has been revised and considerable new matter has been added. The early history and the subsequent development of the injector are given quite fully, following which are definitions of the terms used in the book. The delivery tube, combining tube, steam nozzle, and the action of the injector are the subjects of carefully written chapters. Then follow illustrations and descriptions of the essential features of about all the injectors that have been used to any extent. The methods used for making tests of injectors are also described, and the results of some recent tests are given. The concluding chapter is a discussion of the requirements of modern railroad practice in the matter of boiler feeding apparatus. The repairs and renewals to injectors are also considered, as well as the best methods for feeding locomotive boilers.

Purdue Lectures.—We are in receipt from Purdue University of printed copies of the railroad lectures given at Purdue during the school year 1897-98. There were in all eleven addresses, two of which, at the request of the lecturers, are not published, namely, "Reminiscences of a Locomotive Engineer," by Mr. Angus Sinclair, editor of Locomotive Engineering, and "Experiences in the Motive Power Department of Railroads," by Mr. G. W. Rhodes, Superintendent of Motive Power, Chicago, Burlington & Quincy. The others are as follows: "Problems in the Management of a Railroad System," by Mr. J. T. Brooks, Second Vice-President, Pennsylvania Lines West of Pittsburgh; "The Past, Present and Future of American Railroads," by Mr. M. E. Ingalls, President of the Cleveland, Cincinnati, Chicago & St. Louis; "The Mutual Obligations of Railroad Corporations and the Public," by Mr. John W. Noble, ex-Secretary of Interior; "Relation of Railroads to the State," "Railroads and the People" and "Railroads and Their Servants," the three by Mr. Addison C. Harris, Attorney at Law; "Business Problems of the Motive Power Department," by Mr. Robert Quayle, Superintendent of Motive Power, Chicago & Northwestern; "Railroad Signaling," by Mr. F. A. Delano, Superintendent of Freight Terminals, Chicago, Burlington & Quincy; "Car Designing and Construction," by Mr. A. M. Waitt, General Master Car Builder, Lake Shore & Michigan Southern.

These papers can be obtained by addressing the Secretary of the Purdue University, Lafayette, Ind.

Society for the Promotion of Engineering Education.

(*Continued from page* 611.)

sion was often given to outsiders by an over-statement of importance of the work undertaken.

The report of the Committee on Entrance Requirements was read by Dr. Tyler, but the whole matter was referred to the Council, with power to act. This has been done before the Society at previous meetings, at which time it has been thoroughly discussed.

The following are brief abstracts of the concluding papers:

"The Construction of Models by Students as an Aid in Teaching Descriptive Geometry."—By Henry S. Jacoby, of Cornell University.

Probably no course of study in the curriculum of engineering students makes such demands upon the imagination as a thorough course in the elements of descriptive geometry. The lack of preliminary training in this respect renders the subject difficult to a number of students. Some improvement, however, has been made recently in the attempt to educate the student's imagination to a proper comprehension of the forms in solid geometry.

There is a wide gap between the single projection used in geometry and the two or more projections employed in descriptive geometry. Models are used extensively, but the most of them relate to the latter part of the course, or to the application of the elements. The models available only in the class-room are insufficient for the best results. The student needs the model during lesson preparation. He can make the most useful ones with little expenditure of time and labor from cardboard, thread and wire.

The chief value of a model lies in the effective aid in securing at the beginning of the course clear conceptions of the relation of the figure in space to its projections, and in that it can viewed in those directions which show that the projections form adequate representations of the object for the purposes of the constructive arts. It is not necessary to have models for all the principal problems, but only for selected ones. In the study of the tangency and intersection of surfaces and the form of warped surfaces, the class room models answer the purposes with but few exceptions.

"The Training of Engineers for the Maintenance of Way Department on Railroads."—By J. C. Nagle, of the Agricultural and Mechanical College of Texas.

This paper discussed the question of the proper qualifications of those intrusted with the responsible duties of maintenance of way on railroads, and took the ground that all such work should be entirely divorced from the operating department, being placed under engineering control. As to the training that engineers of maintenance of way should have, as well as that of others in responsible positions, it will be maintained that an engineering college or university course is essential; but as these institutions are now equipped the requisite knowledge of details cannot well be given. A plan whereby this may be accomplished was suggested, and an experiment upon one of the leading railroads of Southern United States was cited to show that young engineers can be found without difficulty, ready to serve as apprentices in any capacity, provided that hope of advancement is held out to them. It was contended that roadmasters and superintendents should be engineers (and even section foremen should have such training as an engineer finds necessary), but at the same time they should have served in the lower ranks of the track force, in order to thoroughly understand every detail of their work. This would require the co-operation of the railroads and technical schools, but in the end would tend toward the betterment of both—the engineering school adapting the courses of instruction to the needs of the railroads, and the latter profiting by the use of technically trained men in every branch of the maintenance of way department.

Prof. C. Frank Allen discussed the subject taken up by Prof. Nagle, stating what had been done by the Massachusetts Institute of Technology in supplying men for the Boston & Maine. Many young men are sent out each year to serve as subordinates, and the result thus far has proved satisfactory to the road

and beneficial to the men. He believed that the engineering graduates are to find their way at the head of different departments in railroad work the same as they had in other engineering work, but they must begin at the bottom and work up.

Recent Engineering Work in Philadelphia.

Although the war has distracted attention from the two very important municipal improvements in progress in Philadelphia, yet the contractors are pushing the work vigorously. The widening of the Delaware River front is probably the more important, as it affects directly the foreign and coastwise commerce of the port and is the final step in the improvement of the river and harbor of Philadelphia, which, undertaken jointly by the city and United States Government, has resulted in a deep waterway to the sea. The new Delaware avenue will be 150 ft. wide from Vine street to South street, a distance of about a mile, and will have open-pile piers from 400 to 600 ft. in length.

Between Pine and South streets nearly all the dredging is completed, many of the old bulkheads torn out and some of the foundation piles driven. At Spruce street wharf a number of the concrete blocks for the bulkhead wall are in place and some back-filling done. From this point to Market street piling for foundations is in place, all the foundation piles have been driven and a large amount of backfilling done.

This portion of the work embraces the ferries operated by the Pennsylvania Railroad and the Reading Railroad companies. The former has practically completed a very handsome two-story steel ferry house, mainly for the accommodation of its seashore and suburban passenger travel. The Reading is also constructing a new ferryhouse, which, however, is far from completion.

The most satisfactory progress in this contract is shown between Market and Vine streets. Here a large portion of the concrete bulkhead is already in place and a considerable part of the back-filling is done. The general character of the work is excellent and reflects great credit on the contractor.

One extremely difficult feature of the work was the construction of the concrete wall, which is formed of huge blocks weighing from 30 to 40 tons. The subcontract for this work was obtained by the Vulcanite Paving Co., which decided to manufacture the blocks at its plant on the Schuylkill River. From there they were loaded on lighters and floated to the work and placed in position by means of large floating cranes.

The other work, which has now been in course of construction two years, is known as the Reading Subway, and is practically the change of grade of the Reading Railroad, so as to abolish all grade crossings along Pennsylvania avenue. The expense of this work is to be shared equally by the city of Philadelphia and the railroad company, and amounts, exclusive of claims for damages, to about $6,000,000. The problems to contend with were extremely difficult, involving not only a complete change in the drainage system of that part of the city, but also the maintenance of uninterrupted railroad facilities to the large number of manufacturing plants located along the line of the work. As some of these plants, such as the Baldwin Locomotive Works, William Sellers & Co., Bement, Miles & Co., are among the largest of the kind in the world, this part of the work had to be carefully studied, especially when it is noted that during the construction several hundred thousand cubic yards of excavated material had to be removed.

The general plan involves a connection with the Reading Terminal tracks at about Eleventh and Callowhill streets, and from there the grade is arranged so as to cross Twelfth and Thirteenth streets above grade, and all other streets from Broad street west below grade. All of the work is open or "subway," except for a distance along the border of Fairmount Park commencing at Twenty-second street, where tunnel construction is used. As the average depth of the "subway" is about 26 feet, the retaining walls are very heavy and some difficult underpinning was done, in many cases almost directly below heavy machines in active operation.

The present condition of the work is as follows:

All the retaining walls are in place from Broad street westward. The highway bridges at Broad, Fifteenth, Seventeenth and Eighteenth streets are opened for travel, and need but a few finishing touches. The highway bridge at Nineteenth street is about half finished, while the others simply have abutments in place.

West of Twentieth street the "core" is composed mainly of hard rock, nearly all of which requires blasting. Of this but a small portion has been removed. East of Twentieth street this "core" consists of gravel, clay and rotten rock, and has practically all been excavated by the steam shovel. Portions of the tunnel nearly completed show that it will be a segmental brick arch.

None of the permanent track is laid, but the contractor is making preparations to commence work on this branch in a few weeks.

The entire work was divided into sections and awarded to the following contractors: E. D. Smith & Co., R. A. Malone & Co., P. H. Flynn & Co., Sullivan Bros., Mason, Hodge & Co., Ryan & Kelly, P. J. McManus, Geo. S. Good & Co.

The prices for excavation varied from 51 cents per cu. yd. for earth to $1.40 for rock.

For masonry the average for rubble was about $5 per cu. yd., for ashlar about $8, for cut-stone about $18, for bridge seats about $28, for brick about $7.50 and for concrete about $5.50.

The Surveys of the Mississippi River.

Last week in our personal column appeared some notice of Mr. Ockerson, recently appointed to the Mississippi River Commission. Under his immediate supervision the river has been surveyed and mapped from St. Paul to the Gulf of Mexico, and as everyone may not know just how complete and thorough those surveys have been we give a few particulars of them.

These surveys comprise all of the refinements of a geodetic survey. Frequent base lines are measured with great accuracy. Azimuth observations are made at each base line and a system of triangulation is carried from the base, the average closure of triangles being less than two seconds. The elevations for topographical work are based on a line of precise level, benchmarks extending from tide water at the Gulf northward along the river to St. Paul. The topography embraces the shore lines of the main river, its islands and bars, and detailed topography with five-foot contours, covering a width of about one mile on each side of the river.

The hydrography embraces the soundings at frequent intervals on lines normal to the stream and along the channel line, and also determination of slope. Discharge measurements are also made at high and low water each year at several points along the river and its tributaries. Continuous records of stage are made at intervals of about 50 miles along the river, and flood slopes are determined by gages placed at intervals of about five miles.

All of this work will compare favorably with the best work of the kind in the world, and much of it is unique, and has been accepted as the standard for similar work at home and abroad.

The Antofagasta & Bolivia Railroad.

The report of the administrator of the Antofagasta & Bolivia Railroad for the year 1897 states that the net income of the line has exceeded that obtained in 1896 by $92,390, in spite of the fact that the average exchange rate for Bolivian money had fallen to $18\frac{5}{16}$d., on which account the income from the Oliagüe. Oruro section had suffered a loss during the year of $ 28,939.

The line from Uyuni to Oruro failed to pay the costs of operation. This is explained partly by the low rate of exchange, and partly by the lightness of traffic on this section, which appears to have reached the maximum which it is possible to expect from its zone of attraction. In order to augment this it will be necessary, sooner or later, to build branch lines to the more important centres of production, such as La Paz, Cochabamba, Colquechaca and Potosi. The Bolivian Government, in view of the unsatisfactory returns from the operation of the road, has authorized the management to impose the maximum tariff on freights during the year 1898, while at the same time it has taken the initiative in interesting capital in the construction of the above mentioned branches.

The freight movement for the year on all sections upward, i. e., inward from the coast, amounted to 165,092 tons, the average haul being 138.4 miles, making 22,852,959 ton-miles. The downward traffic aggregated 377,623.9 tons, the ton mileage being 75,354,849.

The expenses of operation on all sections averaged 58.51 per cent., leaving a net profit of 41.49 per cent. The receipts were distributed as follows: From passenger traffic, 3.36 per cent.; from freight traffic, 95.62 per cent.; from other sources, 1.02 per cent. The distribution of costs was, for administration, 7.25 per cent.; for movement of traffic, 47.96 per cent.; for maintenance of permanent way and rolling stock, 44.79 per cent. On the Uyuni-Oruro section the excess of operating expenses over receipts amounted to 10.54 per cent.

The total locomotive mileage, with 51 locomotives in service, was 1,064,243.84, the highest duty by any one engine being 51,335.68 miles for the year. The average consumption of coal per mile in locomotives was 54.34 lbs., making a total consumption for motive power of 28,915.5 tons for the year.

The company imported during 1897, 89,720 tons of coal, of which the greater part was for the mines of Pulacayo and Playa Blanca of the Compañia Huanchaca de Bolivia. Some was also disposed of to other parties. English coal to the extent of 6,549 tons was imported, the remaining 83,721 tons coming from Australia. The prices stated, which are presumably on board cars at the port of Antofagasta, were respectively $5 00$\frac{3}{8}$ (American gold) per ton for the Australian product, and $6.39½ per ton for the English. When the great Peruvian mines at Hualgayoc, which are now being opened up by an American corporation, the Pacific Co. of New York have begun shipments, the cost of coal along the west coast of South America should be so reduced as to greatly benefit all the railroads in that region.

TECHNICAL.

Manufacturing and Business.

At the receiver's sale the plant of the Bushnell Mfg. Co. of Easton, Pa., was sold complete with a dwelling house on the premises, to F. C. Horton, of the Sterlingworth Railway Supply Co., for $9,635. A tract of land, about ½ acre, was sold to the National Switch & Signal Co. for $442.

The Russell Snow Plow Co. has received orders for Russell wing elevator snow plows as follows: One each from the Michigan Central, the Intercolonial and the Flint & Pere Marquette. The plow for the last named company will be equipped with the Russell air flanger.

G. Fred Collins, who for years has been connected with Valentine & Company, has, in addition to continuing with them, been appointed Eastern representative of Ewald Iron Co., St. Louis, Mo., makers of the Tennessee charcoal bloom stay bolt iron, with headquarters at 57 Broadway, New York City.

Bids were opened at the Navy Department Aug. 23, 1898, for 100,000 each of 6-pound, 3-pound and 1-pound projectiles.

The Chicago Pneumatic Tool Co., 635 Monadnock Block, Chicago, has just received a second order for pneumatic tools from the Imperial Chinese Railroad, and the President of the Chicago Pneumatic Tool Co., J. W. Duntley, is now in New York City closing an order for Japan for 36 pneumatic tools, and three air compressors. The outlook for fall business is very bright. Recent domestic orders include a number of tools for United States Navy Yards.

Iron and Steel.

The Eureka Steel Mfg. Co. of Bradley, Ill., has been incorporated with a capital stock of $50,000. The incorporators are: Edward Hardmeyer, W. A. Hyde and C. H. Mead.

The following officers of Buhl Steel Co. have been elected: President, Warren Arms; Treasurer, David Adams; Secretary, Arthur Buhl. The Directors are: Warren Arms, David Adams, G. A. Baird, Arthur Buhl, T. J. Forker and Nevin McConnell.

The Alabama & Florida R. R. wants 30 miles of rails at once. E. L. More of River Falls, Ala., is President. (See Railroad Construction column.)

Contracts for projectiles for the Navy have been awarded as follows: 1,000 13-in., at $95.40, to the Cumberland Steel & Tin Plate Co.; 1,000 12-in., at $78.96, and 600 10-in., at $46.56, to the Taylor Iron & Steel Co.; 3,000 8-in., at $22.50, to the American Ordnance Co.; 5,000 6-in., at $9.75, 5,000 5-in., at $5, and 5,000 4-in., at $3 to the United States Projectile Co.

The Bethlehem Iron Co., South Bethlehem, Pa., has been asked to bid on the forgings for the engine and shafting of a torpedo boat to be built in Japan for the Imperial Japanese Navy. The line of shafts, including the thrust and crank shafts, are to be hollow.

New Stations and Shops.

The report that the building of a large new passenger station at Chicago east of the present Polk Street Station is under consideration by the Grand Trunk, the Chicago & Erie, the Chicago & Eastern Illinois, the Atchison, and other roads seems to be premature. At any rate, nothing definite has yet been determined upon.

The Chicago, Burlington & Northern is about to build two new round houses to cost $35,000; one of 15 stalls at Savanna, Ill., and one of 10 stalls at St. Paul, Minn. The plans have been drawn and contracts awarded.

The Minnesota Transfer Railway Co. is about to build a new office, heating and lighting plant and transfer shed to cost $25,000. Plans have been drawn and contracts let.

The Choctaw, Oklahoma & Gulf will build new coal chutes at El Reno, O. T.

The contract for the new pier and sheds to be built at Halifax, N. S., for the Intercolonial has been awarded to Rhodes, Curry & Co., of Amherst, N. S. The pier will be 600 ft. long and 160 ft. wide.

The Pennsylvania has filed plans for a two story building at the foot of Cortlandt Street, New York, to replace the old hotel building now there.

The Illinois Central has awarded a contract to Swift & Co. for building a new station at Champaign, Ill.

The Pittsburgh, Bessemer & Lake Erie has awarded a contract for a new passenger station at Erie to Fred Zessinger.

According to press dispatches, the Grand Trunk is having plans drawn for a large five-story office building to be built at Montreal.

The improvements at the Jacksonville, Fla., Union Station are being made mainly by the Plant System. Since the first of the year nearly $200,000 has been spent for filling in swampy ground along the tracks, changing and placing additional yard tracks and building new warehouses. The Florida Central and Peninsular, and the Florida East Coast are building new warehouses at Jacksonville, Fla.

Large Chilled Wheels.

A contemporary in speaking some weeks ago of the use of large wheels under engine trucks and tenders said that one reason for small wheels is that

it is difficult to make a chilled cast-iron wheel larger than 33 in. in diameter and that the attempts to make 42-in. wheels have not been satisfactory. We learn that the New York Car Wheel Works has been furnishing chilled cast-iron wheels of larger diameters for three years; of 40-in. wheels they have sent out on orders 356, of 42-in. wheels 76, and two lots of 45-in. wheels were furnished to the Baldwin Locomotive Works last spring. One lot of the 42-in. wheels made upwards of 100,000 miles and no one of these larger diameter wheels has been returned for any cause.

The Eight-Track Drainage Canal Bridge at Chicago.

A suit was brought Aug. 15 in the Superior Court in behalf of George P. Lee, as a taxpayer of the Sanitary District, Chicago, to enjoin the district from carrying out the contract made with the Scherzer Rolling Lift Bridge Co. for building the eight-track bridge. The awarding of this contract was noted in our issue of Aug. 12. The argument advanced is that the Sanitary District is merely obliged to build a bridge which will meet with the approval of the railroad companies, and that, as the several bridges entered in the competition had all received this approval, it was the duty of the district, under the law governing the Sanitary District, to build the bridge offered by the lowest responsible bidder, who was C. L. Strobel. The petition further asks that the contract be set aside as illegal. The hearing of the suit has been set for Sept. 1.

The New East River Bridge.

Secretary Smith E. Lane of the New East River Bridge Commission has submitted to the Commissioners a financial statement showing that there will be need of another appropriation for the work in a very short time. The report shows that by Nov. 1 next the $2,000,000 raised from the sale of bonds will be exhausted. The total liabilities, partly estimated, are $2,641,204.79, and the balance required by the Commission to meet its obligations Nov. 1 next will be $641,-204.79. Contracts have not yet been awarded for the steel towers and end spans, nor are they likely to be until an appropriation is made.

New Torpedo Boats and Destroyers.

The Navy Department opened bids Aug. 23 for twelve torpedo boats to be of about 150 tons displacement with a speed of 26 knots, to be completed within 12 months and to cost not more than $170,000 each; and for 16 torpedo boat destroyers of about 400 tons, with a speed of 28 knots, to be completed within 18 months and to cost not more than $295,000 each. Bidders were allowed to figure on Department plans or on their own plans. Bids ranged as follows: Torpedo boats, varying from 26 to 29½ knots, one, $152,900 to $170,000; two, $149,400 to $165,000; three, $129,700 to $163,000; four, $114,759 to $162,500; destroyers, varying from 28 to 40 knots, one, $230,000 to $295,000; two, $230,000 to $294,000; three, $230,000 to $289,000; four, $230,000 to $289,000; five, $233,-000 to $289,000. In awarding contracts, price, time of delivery, displacement, speed, design, etc., will have to be considered. The bidders are: Bath Iron Works, Bath, Me.; Dialogue & Sons, Camden, N. J.; Columbian Dry Dock and Iron Works Company, Baltimore; Neafie & Leavey, Philadelphia; William R. Trigg, Richmond, Va.; Union Iron Works, San Francisco; Maryland Steel Company, Sparrows Point; George Lawley & Sons, South Boston; Lewis Nixon, Elizabethport, N. J.; Harlan & Hollingsworth Company, Wilmington, Del.; Frank O. Wellington & Co., Fore River Engine Company, Weymouth, Mass.; Gas Engine and Power Company, New York; Wolf & Zwicker, Portland, Ore., and Richard Painton and Samuel H. Randall of Williamsport, Pa.

The Steel Consolidation.

From various newspapers we glean the following: On Aug. 17 a committee was appointed for the Minnesota Iron Co., consisting of D. N. Bacon, D. O. Mills, Henry M. Flagler and Roswell P. Flower; and also one for the Illinois Steel Co., consisting of J. W. Gates, Nathaniel Thayer, Robert Bacon and A. J. Forbes. On Aug. 18 these committees met and a subcommittee to report a basis for consolidation, consisting of D. N. Bacon, W. L. Brown and H. H. Rogers, was appointed. On Aug. 19 it was decided to form a new company, capitalized at $200,000,000, of which 45% of the stock will go to the stockholders of the Illinois Steel Co. and 55% to the stockholders of the Minnesota Iron Co. The committee on organization is R. P. Flower and Robt. Bacon. Since the meetings recorded above, conferences have been held at Saratoga. According to rumor the Lorain Steel Co. will be absorbed by the consolidation. If the consolidation is effected the new company will control the Elgin, Joliet & Eastern and the Duluth & Iron Range railroads. The latest report is that Illinois Steel stock will go in at 90 and Minnesota Iron stock at 117.

THE SCRAP HEAP.

Notes.

The Boston & Albany has finished oiling its roadbed between Boston and South Framingham, 22 miles. The oil treatment has also been applied to a number of five-mile sections on other divisions of the road.

The Southern Railway Co. has restored the wages of the men in the train and yard service to rates about equal to those in force before the reduction which was made four or five years ago. The increase in most cases is said to be 10 per cent.

On Monday, Aug. 15, train 509 over the Central of New Jersey and the Philadelphia & Reading ran from Jersey City to Philadelphia, 90 miles, in 1 hour and 40 minutes; and from Elizabeth to Jenkintown, 68 miles, in 61 minutes. Within this time speed was slackened twice to take water (near Bound Brook and near Yardley). It is said that certain single miles were traversed in 38 seconds.

A grain elevator of 700,000 bushels capacity, belonging to the Chicago Railway Terminal Co., and situated on the Chicago River, near the Chicago & Northwestern passenger station, Chicago, was totally destroyed by fire on Aug. 20. The building was 400 ft. long, 150 ft. wide and eight stories high, and was surrounded on three sides by railroad tracks. Several freight cars were burned, but the vessels nearby in the river were removed in safety. The building was worth about $200,000, and about $250,000 worth of grain was burnt up. The loss was partly covered by insurance.

The Appellate Division of the Supreme Court of New York has affirmed the verdict of the jury in the lower court, giving John J. Lewis $1,000 damages for injuries received at the Valley Stream crossing May 30, 1897. While the driver of the horses in this accident was undoubtedly at fault, the jury, it will be remembered, believed the testimony tending to show that a suitable whistle signal was not given. Lewis was a member of a party who went for a pleasure drive to Valley Stream on an old-fashioned tally-ho coach. The macadamized highway along which the coach was driven was crossed by the railroad track at a point where the train dodged out from behind a dense piece of forest and crossed the highway on tracks planked in such a manner that a person approaching them would be liable not to discover any break in the smooth surface of the road. The coach was run into by a train and the reporters' summary of the evidence says "with steam shut off, without the customary blowing of the whistle and with but a slight ringing of the bell, not calculated to warn persons of the approach of the train." The report continues: "The track was obscured from the view of those approaching for the distance of a quarter of a mile, until they came within 30 ft. of the track; and the signboard, indicating a railroad crossing, supported upon a single pole, and partially obscured by intervening telegraph poles, was not of the conspicuous character required by the law. Several persons were killed and severely injured. The boy had no knowledge of the highway, nor any reason to apprehend danger. He was seated 15 ft. away from the driver of the coach, and had no authority over him, as regards the management of the horses. The court held, in an opinion by Justice Woodward, that it was not justified in disturbing the finding of the jury, or in reversing the order of the court which denied a motion for a new trial."

The Atchison's Pacific Steamship Line.

Officers of the Atchison, Topeka & Santa Fe say that the new steamship line from San Diego, Cal., to work in connection with the Atchison lines will open for business as soon as the necessary steamers can be secured and placed in commission. The Atchison Company is working a force of men on the yards and dock at San Diego, putting the buildings and grounds in shape. A close traffic contract has been entered into, covering both freight and passenger business, with the California and Oriental Steamship Company, a new American corporation with a capital of $5,000,-000. The officers of the steamship company are: A. H. Butler of San Diego, President; M. Stanley Tweedie of the Tweedie Trading Co., New York, Vice-President; L. B. Stoddart, of the firm of Bowring & Archibald, steamship agents, 9 Stone street, New York, Treasurer. The Vice-President and Treasurer are now in England for the purpose of purchasing two new fast freight and passenger vessels. They have one boat ready to go into commission. Sailings will be made every 25 days from San Diego for Yokohama and Hong Kong, touching at Honolulu. The service will eventually include Manila if that port remains in the possession of the United States.

Mining and Railroad Concessions in China.

Minister Denby writes from Peking, June 16, that several important contracts relating to the development of China have recently been entered into by the Chinese Government. A contract has been made by the Russo-Chinese Bank for a railroad, 140 miles long, from Tai-yu-an-fu, the capital of Shansi province, to Cheng-ting-fu, in the province of Chihli, the first large city south of Pao-ting-fu, the capital of Chihli. Pao-ting-fu is on the trunk line from Hankau to Pekin. This contract also includes mining privileges and the building of necessary branch roads.

A contract has been granted to Mr. Luzatti, agent of an Anglo-Italian syndicate, for working coal, iron and petroleum throughout Central and Southern Shansi, with the privilege of building railroads and cutting canals to join trunk lines or navigable rivers.

The contract runs for a period of 60 years, and is entirely vested in the Anglo-Italian syndicate. This is the greatest industrial concession ever made by China. The engineers and staff are to be composed of English and American engineers. Two American engineers—Messrs. Jameson and Shockley—have visited Shansi, and they report that the minerals are inexhaustible and as yet almost untouched.

I have been credibly informed that the Hankow-Canton line has been granted to an American syndicate, but I doubt whether they have the Hankow-Pekin line. A contract has also been granted an American—Mr. H. H. Lowry—to operate, in conjunction with a Chinese company, the coal mines west of the city, and to build a railroad to Kaigan, conditioned on the raising of 10,000,000 taels ($6,730,000).

Floods in the Streets of Washington.

The rainstorm in Washington, D. C., on Aug. 12, referred to in our last issue, was the heaviest ever recorded in that city, the quantity of water falling between 8 a. m. and 5 p. m., amounting to 5.92 inches. Most of this fell during the last two and a half hours. Many of the sewers of the city were totally inadequate to carry off the water, and at one time water was gushing out of the sewer openings all over the lower part of the city. The stoppage of the electric cars, worked by underground conduits, was due to the complete filling of the conduits. Important lines were stopped for three hours or more. Water covered the platforms in the Pennsylvania Railroad station. There were several washouts on the electric roads in the suburbs. The railroad station at West Chevy Chase floated off its foundation. The Pennsylvania Railroad had a culvert carried out south of Alexandria, and the foundation of a bridge was washed away on the Washington, Ohio & Western.

On Wednesday, Aug. 10, the city of Philadelphia was visited by a rainstorm, which evidently was about equal in volume to that reported from Washington two days later. The total fall is reported as 5.74 in. The time covered by this report is not stated, but apparently it was only two or three hours. Property was damaged in all parts of the city, and the Philadelphia Press estimates that the loss will aggregate more than one million dollars, though no accurate estimate can be made. Sharp lightning continued throughout the storm, but little or no damage was reported from this cause. Atlantic City, only 56 miles away, had no rain at all on that day.

A Railroad Men's Town.

Rennerdale is the name of a village which has been started by employees of the Pennsylvania lines about 12 miles west of Pittsburgh, on the Pittsburgh, Cincinnati, Chicago & St. Louis, and in which six houses have already been put up.

The association owning the land at this place was formed in 1895, the principal participants being employees of the Accounting Department of the Pennsylvania Lines West of Pittsburgh, of which Mr. John W. Renner is the head. Mr. Renner is a member of the Association, and Chairman of the Executive Committee. In the year named a tract of 60 acres of land was bought, and in 1896 it was divided into 60 lots of nearly equal size, with streets 60 ft. wide. The lots were distributed to the 60 members by an equitable plan, and each one contributes regularly to the fund with which the land is to be paid for and the street expenses defrayed. Last year the streets were graded, and this year trees have been planted. The officers of the Association serve without pay. No provision is made by the Association for building houses, each member acting on his own responsibility and borrowing money, if he wishes to borrow, wherever he finds the most favorable terms. Since the establishment of the Association an additional tract of 40 acres has been bought by other railroad employees, adjoining the first tract. There are in the Association a few members not engaged in railroad service. The officers of the Association are John W. Renner, Chairman; W. E. Morrow, Secretary; John M. Lyon, Treasurer, and W. B. Quartz, Trustee.

Electric Headlights in Australia.

From an account in the Sydney Morning Herald it appears that electric headlights are being tried on the night passenger trains of some of the lines of the New South Wales railroads. On the Moree Line, where the country is very thinly settled, it was decided, when the railroad was built, to save the cost of fencing by limiting the speed of trains and running few or none at night; but a demand for night trains has arisen, and the commissioners have decided to try the electric headlight instead of going to the expense of building fences. It appears that the commissioners are highly pleased with the light; and in Australia, as in America, sheep's eyes are found to pass for green switchlamps (provided the sheep will stand still).

Fast Trains in England.

The summer timetable of the London & North Western shows that the speed of several express trains has been increased. The table provides for two trains between London and Liverpool, 201 miles, at 51.8 miles an hour; five trains from London to Crewe, 158 miles, at 51.6 miles an hour; two from Carlisle to Crewe, 141 miles, at 52.9; two from Wigan to Carlisle, at 52.6, and two between Willesden and Sheffield at 52.2.

Pneumatic Interlocking in England.

Transport of Aug. 12 states that the Great Eastern Railway is erecting a large signal plant at Whitechapel, London, to be worked by [Westinghouse] electro pneumatic apparatus.

The Manchester Ship Canal.

There is a noticeable improvement in the report of this company for the last half year, as, instead of the loss of £894 shown in the accounts of a year ago, there is now a credit balance of £20,573. The Bridgewater Department account has also netted an increase, the profits amounting to £21,706. The net revenue of £42,669, however, has been more than absorbed in meeting the interest on first and second mortgage debentures of £44,732, and it was necessary to take £2,073 from the previously accumulated revenue of the Bridgewater Department to complete the required interest. The tonnage returns are also satisfactory, sea-going tonnage reaching a total of 979,-992 tons, as compared with 783,280 tons, an increase of 196,712 tons, while the barge traffic was 193,888 tons, against 173,930. The total increase in tonnage was 216,670 tons. In the course of his speech to the shareholders Mr. J. K. Bythell, who presided, hoped the citizens of Manchester would now support them with their own traffic, and influence others to do the same. With regard to the capital account, they had spent a certain sum for necessary works. At the end of 1896 they found they had a terrible deficiency in dock accommodation, which led to delay in handling traffic, and caused complaints from merchants as to the delay in distribution of merchandise from the docks. They had now applied the remedy by spending on the Manchester docks and appliances £59,000, and it had made a difference in the working of the labor and railway departments of no less than 44,800 tons. He also commented with sat-

isfaction on their traffic progress and prospects. They had at length succeeded in establishing a line of Manchester steamers which would run only between their own and other ports. In conclusion, he asked them not to take too rosy a view of the early future of the company. He said early because they all believed in the ultimate success of their undertaking. They were gaining day by day a very considerable position in the traffic world, and were laying the foundation of a colossal trade, which would eventually make Manchester one of the foremost ports in the Kingdom.

Breakfast Cars.

The Great Eastern Company is having built at its workshops at Stratford some new "bogie" breakfast cars for the convenience of passengers traveling from Norfolk and Suffolk to London in the early morning. The breakfast car will be 55 ft. in length, and be provided with accommodations for first and third-class passengers. Attached, and communicating with the breakfast-car at one end, will be a first-class vestibule saloon carriage, and at the other a third-class vestibule saloon carriage. The charge for breakfast will be fixed on a moderate scale, to meet the requirements of all classes of passengers.—Transport.

Brooks Locomotive No. 3,000.

On July 23 the employees of the Brooks Locomotive Works, Dunkirk, N. Y., had a picnic to celebrate the completion of the three-thousandth locomotive built at the works. The engine was one of the 106-ton mastodon type, built for the Great Northern, and described in the Railroad Gazette of Jan. 7 last. The one-thousandth locomotive was turned out of the Brooks Works in 1884, and the two-thousandth in 1891. The picnic was attended by about 4,000 persons, and the Brooks Company furnished transportation and music.

Tunnel Accident Near Pittsburgh.

On the night of Aug. 22 eight men were killed and seven injured, two of them fatally, by the falling of a wall in a tunnel near Carnegie on the Chartiers Division of the Pittsburgh, Cincinnati, Chicago & St. Louis. The men were part of a force of 68 employed by a contractor in taking out the lining of the tunnel with a view to its enlargement. They had just fixed a rope to a part of the west wall of the tunnel, and were preparing to pull it over, when it fell on them. A part of the structure had been loosened by a blast about an hour before.

M. C. B. Couplers in England.

Barnum & Bailey have evidently introduced a new idea into English railways with their special trains. The long trucks [platform cars], and heavy cars required for their work, with bogie trucks at each end, are not unknown here, having been introduced in the Pullman cars, but their automatic couplers and air brakes are being studied by railroad men generally, and have given rise to some discussion. This discussion is finding its way into the correspondence columns of the newspapers. With these couplers it is not necessary to step between the cars in order either to couple or uncouple them. The railway arrangements of the big show are much admired by railway men. The manner in which the heavy "properties" for the performance are handled is not less admirable than the performance itself.—Birmingham (Eng.) Post.

The Conneaut Car Ferry.

The car ferry line running in connection with the Pittsburgh, Bessemer & Lake Erie between Conneaut Harbor, O., and Port Dover, Ont., has changed its Canada terminus to Port Stanley, about 70 miles west of Port Dover and eight miles south of St. Thomas' with which place connection is made by the Lake Erie & Detroit River Railroad. At St. Thomas this road connects with the Grand Trunk, the Michigan Central and the Canadian Pacific. A new dock has been built at Port Stanley, and it is said that the Dominion Government will deepen the harbor.

Great Northern Improvements at Seattle.

In addition to the warehouse which the Great Northern Railway will build at Seattle, the company is to have a large dock for ocean vessels. President Hill tells a reporter that the company is negotiating for land on which to build a dock 2,000 ft. long. The channels each side of it will be 200 ft. wide, and will be made 25 ft. deep at low water. Railroad tracks will be laid on the docks. It is also stated that the company contemplates building a large steel grain elevator.

LOCOMOTIVE BUILDING.

The Monongahela River has placed an order with the Pittsburgh Locomotive & Car Works for two engines.

The Atlantic, Valdosta & Western has placed an order with the Baldwin Locomotive Works for three engines.

The Kansas, Oklahoma Central & Southwestern expects to place an order within the next 30 days for four locomotives.

The Baldwin Locomotive Works have received an order to build two more engines for the Government railroads of New Zealand.

The Tennessee Coal, Iron & Railroad Co. of Birmingham, Ala., will probably require one or two locomotives for use in connection with a large steel plant now building.

In our last issue we referred to the Iowa Central order for four 10-wheel freight engines placed with the Pittsburgh Locomotive & Car Works. These engines will have cylinders 18-inx26-in., driving wheels 62 in. in diam., and will weigh about 112,000 lbs. in working order, with 88,000 lbs. on the driving wheels. The boilers will be of the Belpaire type, the fire-boxes will be 96 in. long by 34⅜ in. wide, and the tenders will have a capacity of 3,500 gals. of water and seven tons of coal. The equipment specified is as follows: New York air brakes, Midvale axles and tires, Trojan couplers, Ohio and Monitor injectors, Leach sanding devices, Detroit lubricators and Scott springs.

The 12 locomotives ordered by the Plant System from the Richmond Locomotive & Machine Works, and referred to last week, are for Oct. 15 delivery and will weigh 132,000 lbs., with 98,000 lbs. on the drivers, and have 19-inx26-in. cylinders, wagon top boilers, fire boxes about 98 in. long and 40 in. wide; working steam pressure 200 lbs. and tank capacity for water 4,200 gals. Half the engines are for freight and half for passenger service, and the former will have 58-in. driving wheels and the latter 69-in. All will have Westinghouse brakes, Coffin process steel axles, Marden brake beams, Ross-Meehan brake shoes, Janney couplers, Monitor injectors, U. S. Metallic piston and valve rod packings, Coale safety valves, Leach sanding devices, Nathan lubricators, French springs, Crosby gages, Latrobe tires, steel wheel centers, Ajax metal bearings, Richardson valves, Carnegie steel and American steel trucks.

CAR BUILDING.

The Barney & Smith Car Co. is building 20 flat cars for its own use.

Pullman's Palace Car Co. is building 10 cars for its general railroad service.

The Louisville & Nashville has placed an order with the Elliott Car Co. for 200 flat cars.

The Pecos Valley & Northeastern expects to buy 20 flat and 15 coal cars some time this fall.

The New Orleans & Northeastern is having 50 cars for freight service built by the Ohio Falls Car Mfg. Co.

The Missouri Car & Foundry Co. is just finishing an order of 100 cars for the Cold Blast Transportation Co. of Kansas City.

We understand that the Canadian Pacific will build 1,000 more box cars at its shops when the present lot of 1,000 is finished.

Pullman's Palace Car Co. is building one car for the Union Pacific and two for the Baltimore & Ohio. These are for first-class passenger service.

The Southern has given an order to the Barney & Smith Car Co. for 10 first-class coaches, and to the Jackson & Sharp Co. for one 50-ft. postal car and four combination passenger and baggage cars.

The St. Louis Southwestern has placed an order with Pullman's Palace Car Co. for four parlor and four chair cars, and with the St. Charles Car Co. for four chair and two mail and express cars.

The Kansas, Oklahoma Central & Southwestern expects to buy 300 flat and coal cars, six passenger coaches, three combination cars and 12 cabooses. Some of these may be ordered within the next 30 days.

The 25 flat and 25 box cars being built by the St. Charles Car Co. for the Centralia & Chester will be of 60,000 lbs. capacity and equipped with Westinghouse brakes and Gould couplers. The box cars will have Lawler grain doors and Murphy roofs.

The White Pass & Yukon Railroad, of Alaska, is having 30 flat and 20 box cars built at Seattle, Wash. The lumber is to be furnished by the Stetson & Post Mill Co., and the trucks by the Pacific Coast Co. The cars will be put together under the direction of W. H. Garlock, Master Mechanic of the railroad. A contract has been given to the Griffin Wheel Co., of Tacoma, for 100 car wheels. According to a newspaper report, a passenger car, baggage car and combination baggage car was shipped to Alaska last week for use on the White Pass & Yukon Railroad.

In our issue of Aug. 12 we stated that the Barney & Smith Car Co. was building seven cars for the Georgia Southern & Florida. These consist of four passenger coaches, one mail and baggage car and two express cars. The passenger coaches will be 52 ft. long and 9 ft. 8 in. wide over sills, and the express cars 50 ft. long and 9 ft. 8 in. wide. The mail and baggage car will be of the same dimensions as the express cars, with a room for handling the mail 25 ft. long. Pantasote curtain materials, mounted on Forsyth fixtures, will be used on the passenger cars, and Marden brake beams, Christie brake shoes, Westinghouse brakes, Janney couplers and draft rigging, Baker heaters, McCord journal boxes and lids, Standard steel platforms, French springs and Barney & Smith's standard four-wheel trucks will be used on all the new equipment.

The Cincinnati Street Railway Co. has placed an order with the Laclede Car Co. for 50 closed cars. The trucks will be furnished by the Peckham Motor Truck & Wheel Co. and the electrical equipments by the General Electric Co.

The Cleveland Electric Railway Co. is having 20 closed car bodies, 24 ft. long, built by the G. C. Kuhlman Co. of Cleveland. They will be mounted on Du Pont single trucks and equipped with Westinghouse No. 49 motors and K controllers. The sand-boxes and operating mechanism are from designs of the railroad. The John Stephenson Co. of New York City is building five 28-ft. car bodies for the road, four of which are to be mounted on Brill double trucks of a new design, and the other on Peckham double trucks. The company is also having one 28-ft. car body built by the J. G. Brill Co., to be mounted on Brill double trucks of special design.

BRIDGE BUILDING.

BARTLESVILLE, I. T.—The Kansas, Oklahoma Central & Southwestern will require two bridges. See Railroad Construction column.

BEDFORD, IND.—Sixteen bridges will be required on the Indiana Stone RR. (See Railroad Construction column.)

BIG RAPIDS, MICH.—The Grand Rapids & Indiana Ry. Co. is building a bridge at Upper Big Rapids over the Muskegon River. It is to be a steel structure on masonry and will consist of three plate girder deck spans of 100 ft. clear opening each. The builders of the superstructure are the Detroit Bridge & Iron Works. The masonry work will be done by H. W. Tapp of Ft. Wayne, Ind. It will cost about $18,000 and is to be finished Oct. 1, 1898.

BOUND BROOK, N. J.—The Brunswick Traction Company will build a bridge over Green Brook.

BUTLER, PA.—A new bridge will probably be built by Butler County at Saxon station over Little Buffalo Creek.

CHARLOTTETOWN, P. E. I.—A bridge will be required on the line of a railroad projected to run south from Charlottetown. (See Railroad Construction column.)

COLUMBUS, O.—Bids will be received by the Auditor of Franklin County until Sept. 13 for rebuilding a bridge over a run on Amity Pike. W. H. Halliday, Auditor.

EAU CLAIRE, WIS.—It is stated that an election will be held Sept. 6 to decide the question of issuing bonds for a new bridge. The bridge contemplated will cost about $50,000.

DECATUR, IND.—It is stated that bids are wanted Aug. 31 by the Auditor of Adams County for building three iron bridges.

INDIANA, PA.—Viewers have been appointed to report to the court on the question of a bridge over the Conemaugh River, near Stranford. Viewers were also appointed to consider the question of a bridge over Pickering Run in East Mahoning township. James A. Crossman, Clerk, Indiana County.

MILL CITY, ORE.—The committee appointed to investigate a site for the bridge to be built jointly by the two counties (Marion and Linn) at Mill City, reported that the site of the old bridge is the most desirable and recommend a Howe truss bridge, the main span to be 175 ft. 9 in. from center to center and the span on the south side of the river 90 ft.

MINNEAPOLIS, MINN.—The City Council has adopted the recommendation of its Ways and Means Committee that $30,000 be appropriated for widening the Central Ave. bridge over the East River channel, and the matter is now in the hands of the Board of Tax Levy.

ORILLIA, ONT.—R. A. Jupp, it is reported, is receiving bids for building two bridges over the Severn River, known as the West Beach bridge and the Bennett bridge.

PLACERVILLE, CAL.—Bids will be received until Sept. 6 by the Board of Supervisors for building a combination deck bridge across the North Fork of the Cosmunes River at Wisconsin Bar. A. S. Bosquit, Clerk, Eldorado County.

RIVER FALLS, ALA.—The Alabama & Florida RR. will require three bridges. (See Railroad Construction column.)

UNION, ORE.—Bids are asked until Sept. 7 for building a county bridge over Grand Ronde River at Island City, to have a 125-ft. span and 18-ft. roadway. G. W. Benson, Clerk, Union County.

WESTFIELD, MASS.—The County Commissioners have ordered the re-location of a part of Main street and the construction of a new iron or steel bridge over Little River in place of the present Truesdell truss. The new bridge is to be 115 ft. long, with a roadway 22 ft. wide and one 5-ft. sidewalk. The Selectmen will carry out the order.

RAILROAD LAW.—NOTES OF DECISIONS.

[The cases here noted are all decided by the courts of the State of New York.]

A verdict for injury caused by a collision between a wagon and a cable car is sustained on appeal. It appeared that the driver of the wagon, driving at five or six miles an hour, attempted to cross the track when the car was about 20 ft. away and running about 8 miles an hour. The gripman did not attempt to stop the car until the collision was inevitable, though if he had done so when he first saw the driver starting to cross the track it could have been avoided. The court holds that the rights of drivers of vehicles and those of gripmen of cable cars are reciprocal, and the gripman is bound to use as much diligence to avoid running into a vehicle which is crossing its tracks as is the driver of a vehicle to avoid running into a street car crossing its path. It must not be assumed that because a vehicle cannot entirely clear an approaching car with certainty its driver has no right to attempt to cross. (Decided by the Appellate Division of the Supreme Court, June, 1898.)[1] While this decision asserts no new rule of law, the language of the opinion is so emphatic as to plainly indicate a disposition on the part of the court to hold street railroad companies to a strict accountability for any failure to govern their conduct in accordance with the rule reasserted.

On the trial of an action to recover damages for personal injuries it appeared that the plaintiff, who was riding in a buggy at the invitation of the owner and driver, saw a street car coming when about 25 ft. from the track, and told the driver to "slow up." While driving slowly across the track the buggy was struck by the car and the plaintiff injured. The court refuses to disturb a verdict in her favor, holding that, since she had no power or authority to control the actions of the driver, her suggestion to him was of no consequence and she was not chargeable with any negligence contributing to the accident by reason thereof or otherwise. (Decided by the Appellate Division of the Supreme Court, May, 1898.)[2] The law applying to such cases is different when the relation of master and servant is shown to exist, and this relation is held to exist even where the vehicle collided with is hired.[3]

A passenger on an electric car became alarmed by an escape of flame from the controller and jumped from the car while it was in motion and was hurt. This flaming was of an unusual character. On the trial of an action against the railroad company to recover damages for the injury some witnesses described the flame as being from two to six feet in height, so that the whole front of the car seemed to be on fire. The controller was out of order and the conductor knew it. There had been no inspection of the car when it started on the trip. Proof of this condition of things, in the absence of a sufficient explanation from the railroad company that it did not arise from want of proper care, is held to establish negligence on its part and freedom from contributory negligence on the part of the plaintiff. Accordingly a verdict in her favor is sustained. (Decided by the Appellate Division of the Supreme Court, May, 1898.)[4]

Evidence that a fly-wheel, which had been used two years in generating the electrical power of a street railroad, exploded at the end of that time is not sufficient by itself to establish negligence such as will entitle one injured thereby to recover damages for the injury. (Decided by the Appellate Division of the Supreme Court, May, 1898, one Judge dissenting.)[5] This is not one of the cases where mere proof of an accident, unless satisfactorily explained, is enough to establish negligence, as is the case—to take a few examples in New York from among many—where a railroad train runs off the track,[6] or where a span wire supporting a trolley wire breaks.[7] The test seems to be, speaking very generally, whether the occurrence

is of such a nature that the first thought that comes to the mind is that nothing but careless or willfulness could have produced it.

A passenger on a railroad train on arriving at his destination at about 7.30 p. m., after seeing his trunk taken from the train, went away and made no effor to claim it until the next morning, when it was found that burglars had broken it open during the night and stolen part of the contents. It had been locked up in the station, as was usual. The court holds that, under these circumstances, the railroad company was not liable for the loss absolutely, as an insurer of property is liable, and as it would have been if it had remained a common carrier in relation to the owner. This relation had ceased when the trunk was received at its destination and a reasonable time had been allowed to remove it. It was liable only as a warehouseman, and so only bound to store the trunk, taking such precautions as prudent men ordinarily exercise in the care of their own property. It is further held that the company did take every precaution required of it as warehouseman. (Decided by the Appellate Division of the Supreme Court, May, 1898.)[8] Two Judges dissent, on the ground that sufficient time was not allowed the plaintiff in which to remove his property.

A street railroad company is held to be liable for injury to a passenger by reason of the motion of an electric car in passing around a curve only when the speed is excessive, or more electric power is applied than is necessary to properly drive the car around the curve. Where a passenger who had entered an electric car stopping on a curve, in passing around which no accident was shown to have previously occurred, was, while standing and about to take a seat, so violently twisted about by the motion of the car in passing from the curve to the straight track as to be injured, there being no evidence as to the speed of the car, a case was presented which should have been dismissed without submission to the jury, as in such a case a jury is not warranted in inferring that there is an excessive use of electric power. Accordingly, a verdict for the plaintiff in such a case is set aside. (Decided by the Court of Appeals, June, 1898.)[9] It is held that a railroad company is under no obligation to a passenger to prevent any jolting of an empty passenger car standing at a point other than the station platform, when the passenger has not been personally invited to get on the car at that point by any of the company's representatives; and it does not appear that any person in control of the train knew that the passenger was attempting to get on. (Decided by the Court of Appeals, June, 1898, three Judges dissenting.)[10]

1. Kennedy vs. Third Avenue, 31 App. Div., 30.
2. Berghold vs. Nassau, 30 App. Div., 438.
3. Brickell vs. N. Y. C. & H. R., 120 N. Y., 293.
4. Poulsen vs. Nassau, 30 App. Div., 246.
5. Piehl vs. Albany Ry, 30 App. Div., 166.
6. Edgerton vs. N. Y. & H., 39 N. Y., 227.
7. Jones vs. Union Ry., 18 App. Div., 267.
8. Graves vs. Fitchburg, 29 App. Div., 591.
9. Ayers vs. Rochester Ry., 156 N. Y., 104.
10. Jones vs. N. Y. C. & H. R., 156 N. Y., 187.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Atlanta & Danville.—Preferred, 1 per cent., payable Sept. 1.

Chicago, Burlington & Quincy.—Quarterly, 1½ per cent., payable Sept. 15.

Buffalo & Niagara Falls.—Quarterly, 1 per cent., payable Sept. 15.

Metropolitan St. (N. Y.).—Quarterly, 1¼ per cent., payable Sept. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.

American Street Railway Association will hold its annual meeting at Boston Sept. 6 to 9.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges and Buildings.—Eighth annual convention, Murphy's Hotel, Richmond, Va., from Oct. 18 to 20.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.

Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car and Locomotive Painters' Association.—Annual convention, Ryan Hotel, St. Paul, Minn., Sept. 13 to 16, both inclusive.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

National Railroad Master Blacksmith Association.—Sixth annual convention, Boston, Sept. 6.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

Roadmasters' Association of America.—Annual convention will be held at the St. James Hotel, Denver, Sept. 13, 14 and 15.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Street Railway Accountants' Association of America will hold its second annual meeting in Boston Sept. 6 to 9.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

Western Railway Club.—Meets in Chicago on the Third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters at the Society are at 1736-1739 Monadnock Block, Chicago.

Canadian Roadmasters.

We understand that the roadmasters of the railroads of Canada are to meet in Ottawa, Sept. 19, for the purpose of forming an association.

Railroad Agents of New England.

The Railroad Agents' Association of New England will hold its customary fall outing on Sept. 12-15, taking in on the route the Ausable Chasm, Lake George, Saratoga, Albany and Lake Champlain. The start will be made from Boston.

New England Railroad Club.

The annual excursion of the New England Railroad Club will be held Tuesday, Sept. 13. A special train will leave Park Square station, Boston, at 9:05 a. m., connecting at Fox Point, Providence, with chartered steamer of the Providence, Fall River & Newport Steamboat Co. After a short sail, a landing will be made at Crescent Park, and at 12 o'clock, Geo. B. Boyden will serve a famous Rhode Island shore dinner. Returning, the boat will leave Crescent Park about 2 p. m. for a sail on the bay, arriving at Fox Point to take special train about 5 p. m.

International Association for Testing Materials.

The American section of the International Association for Testing Materials will hold its first annual meeting in the rooms of the Engineers' Club, 1122 Girard street, Philadelphia, at 3 p. m., Aug. 27. The principal session will be held in the evening, at which time there will be a discussion on the relations of the International Association to producers and consumers. This will be opened by Dr. Chas. B. Dudley and Mr. Wm. R. Webster. Prof. R. C. Carpenter and Mr. Gus C. Henning will open a discussion on the influence and adaption of standard specifications as relating to the improvement of industrial methods and processes. Full information regarding the work of the Association or further details of this meeting may be obtained from Mr. R. L. Humphrey, Philadelphia.

Roadmasters' Convention.

Mr. H. W. Frost, Secretary and Treasurer of the Road and Track Supply Association, advises that arrangements have been made through the several passenger associations for a reduced rate from all parts of the United States to Denver, the rate being, in event one hundred paid tickets are bought, one and one-third fare for the round trip. This arrangement will be conducted on the certificate plan. The Roadmasters will leave Chicago on a special train at 10.30 p. m. Sept. 10, via the Burlington, and Mr. Frost has arranged with that company to honor tickets purchased by the members of the Road and Track Supply Association on the same train. This train will be composed entirely of sleepers and will have dining cars.

American Street Railway Association.

A full programme of the Boston meeting, to be held Sept. 6 to 9, has been printed. On Tuesday morning the meeting will be called to order at 10 o'clock by President A. E. Lang. After the roll call, the President's address, the report of the Executive Committee and the report of the Secretary and Treasurer, Mr. Richard McCulloch will present his paper, the title of which was given in our issue of Aug. 5, p. 570, with the subjects and the writers of all the papers to be presented at the different sessions. In the afternoon a trip will be taken to Concord and Lexington and in the evening there will be a reception at Mechanics' Hall.

On Wednesday morning, at 9:30, the papers of Messrs. M. S. Hopkins and W. S. Dimick will be read and in the afternoon an excursion will be taken down the harbor, including a clambake at Nantasket Beach.

Thursday morning, at 9:30, Messrs. W. H. Holmes and Frederick D. Perkins will present their papers, after which the election of officers will take place. In the afternoon a trip will be made to Plymouth, and in the evening there will be the annual dinner at Hotel Brunswick at 7:00 o'clock.

On Friday morning the only paper to be presented will be by Mr. R. W. Conant, after which a report will be given by the Committee on Standing Rules for the Government of Conductors and Motormen. The unfinished business and the installation of officers will conclude the meeting. In the evening a trolley excursion to Norumbega Park will be taken. Pleasant trips have been arranged for the ladies on the mornings of Wednesday, Thursday and Friday.

PERSONAL.

—Mr. Albert E. Pancoast, President of the Philadelphia & Reading Coal and Iron Co., died at Elberon, N. J., Aug. 19. He was 58 years of age.

—Mr. Chas. Gisner, Station Agent at Dobbs Ferry on the New York Central & Hudson River for the past 47 years, died Aug. 17. He was 71 years of age.

—Mr. Chas. H. Lyon, Superintendent of Mails in the Brooklyn Post Office and Chief of its Railroad Mail Service, died in Brooklyn, Aug. 23. He was 60 years of age.

—Mr. Henry C. Lehman, President of the projected and partially completed Reading, Lancaster & Baltimore, died in Lincoln County, Kan., Aug. 22. He was 67 years of age. Mr. Lehman's home is at Lancaster, Pa.

—Mr. G. T. Whedon, who was lately appointed Superintendent of the United Verde & Pacific, with headquarters at Jerome, Ariz., succeeded Mr. John Burns, resigned. Mr. Whedon was Superintendent of the Mount Lowe Railway and Electric Line previous to his appointment with the U. V. & P. He was formerly Superintendent of the Arkansas Division of the St. Louis, Iron Mountain & Southern, with headquarters at Little Rock, Ark.

—Mr. A. M. Holcomb, who was recently appointed Assistant Chief Engineer, Chicago & Great Western, has been for the past two years principal Assistant Manager in charge of the construction of the Ferrocarrill del Norte, on the Guatemala Northern, of which 135 miles is completed and now being operated. Sixty-five miles more of this road is yet to be constructed. Operations were discontinued after the deaths of President Barrios and Contracting Engineer Sylvanus Miller.

—Mr. John T. Milner, who has been closely identified with railroading in the South in one way or another for many years, died at his home in New Castle, Ala., on Thursday morning last, at the age of 72 years. At about 20 he went with Mr. Geo. H. Hazlehurst, then engaged on the Macon & Western Railroad. In 1853 he returned to Alabama, and was connected for five years with the Montgomery & West Point Railroad at Chehaw. In 1858 he was engaged by the state in the survey of the South & North Alabama Railroad, connecting the navigable waters of the Alabama rivers with those of Tennessee. He was Chief Engineer of this road from 1856 to 1872. Since that time he has only indirectly been interested in railroading, but has directed the work of a number of industries throughout Georgia.

—Mrs. Sophia Braeunlich, Business Manager of the Engineering and Mining Journal (the Scientific Publishing Company), New York City, died at her home in Brooklyn, N. Y., on Aug. 11, after a brief illness, at the age of 44. Mrs. Braeunlich was born in Brooklyn and had lived there all her life. On the death of her husband, a very short time after their marriage, she entered the office of the Engineering and Mining Journal as an amanuensis, and by unusual executive ability rapidly rose to a more important position. She became Secretary and Treasurer of the company in 1888, and was appointed Manager in 1890. Mrs. Braeunlich was systematic in all her work and her life was characterized by tireless industry; and the business of the office under her hands was performed with energy and good discipline; a marked devotion to duty was noticeable throughout the force under her charge. To those who knew her she will be remembered, however, not more for her success as a business woman than for her gentle and womanly ways, her unselfish spirit, her sympathetic friendship and her constant devotion to the right.

—Mr. W. O. Spriggs, who was recently appointed Superintendent of the Easton & Amboy and Lehigh Divisions of the Lehigh Valley, succeeding Mr. James Donnelly, resigned, entered railroad service in March, 1879, as a rodman and levelman on the St. George's Creek & Cumberland. He remained there two years, after which he was appointed Assistant Engineer on the West Maryland Extension of the Baltimore & Cumberland Valley. He remained with that road for eleven years and in 1881 became Assistant Engineer of the Pittsburg & Western. The following year he became Roadmaster of the Baltimore & Ohio. Four years later he was appointed Engineer Maintenance of Way on the New York extension of that road, and from 1886 until November, 1894, he was Master of Transportation on the Staten Island Rapid Transit, which road is operated by the Baltimore & Ohio. In 1894 Mr. Spriggs became Superintendent, which position he held until February of this year, when he resigned to become Superintendent of the Asheville Division of the Southern Railway, with headquarters at Asheville, N. C. This position he has held up to his recent promotion.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio Southwestern.—J. F. Murphy has been appointed Contracting Freight Agent, with headquarters at St. Louis. J. C. Marquette has been appointed Superintendent of the dining car service succeeding Supt. W. Porter, who retires on account of sickness.

Beaver Meadow, Tresckow & New Boston.—Israel Platt Pardee has been elected President, vice A. S. Van Wickle, deceased.

Central of Georgia.—W. P. Levis has resigned his position as Commercial Agent of the Georgia & Alabama, at Columbus, Ga., to accept a position in the Freight Department of the C. of G. at Savannah.

Chicago Great Western.—George F. Heusner, Agent in charge of the Oregon District, has had his title

changed to that of General Agent. His headquarters are at Portland, Ore.

A. M. Holcomb has been appointed Assistant Chief Engineer, succeeding H. A. Stahl, resigned, with headquarters at St. Paul, Minn.

Chicago, Milwaukee & St. Paul.—The offices of the Kansas City Division, which are located at Ottumwa, Ia., will be removed to Kansas City, Mo., where they had been located two years ago.

Wm. Kelly, Jr., who has been traveling Passenger Agent, with headquarters at Buffalo, has been appointed General Eastern Passenger Agent, succeeding the late E. F. Richardson, with headquarters at New York City.

Daniel B. Worthington, heretofore Freight and Passenger Agent of the Canadian Pacific in Buffalo, has been appointed Traveling Passenger Agent of the C., M. & St. P., with headquarters in Buffalo. Mr. Worthington succeeds Wm. Kelley, Jr., promoted.

Chicago, Rock Island & Pacific.—E. S. Hull has been appointed Commercial Agent, with headquarters at New Orleans, La.

Cincinnati, Cleveland, Chicago & St. Louis.—G. Wirt, heretofore General Foreman of the C. C. C. & St. L. at Wabash, Ind., has been appointed Master Mechanic of the Louisville Terminals of this road and the Chesapeake & Ohio, to succeed W. A. Bell, resigned.

Cincinnati, Hamilton & Dayton.—Willard Stoms, who was recently appointed Advertising Agent of this road, has resigned on account of ill health. Park Cowan, whom Mr. Stoms succeeded, has again taken the place. (July 29, p. 555.)

John Leahy is to resume his connection with the C., H. & D. on Sept. 1 as General Southern Agent, with headquarters at Cincinnati, O.

Florida East Coast.—H. S. Kelphofer, heretofore Chief Clerk to W. A. Winburn, General Freight Agent Central of Georgia at Savannah, has been appointed General Freight Agent of the F. E. C., with headquarters at St. Augustine, Fla. Mr. Kelphofer succeeds W. J. Jarvis.

Grand Rapids & Indiana.—H. E. Dalzell, formerly General Office Agent, has been placed in charge of the Ticket Department of the Auditor's office, succeeding G. C. Allen, lately appointed Traveling Passenger Agent.

Grand Trunk.—J. H. Burgess has been appointed City Passenger and Ticket Agent at Chicago, succeeding L. R. Morrow.

Gulf, Colorado & Santa Fe.—J. Brewer, formerly Roadmaster on the Montgomery Branch, has been appointed Roadmaster, succeeding Mr. James Wade, resigned, with headquarters at Alvin, Tex. S. B. Skinner has been appointed Roadmaster, succeeding Mr. Brewer, with headquarters at Somerville, Tex.

Hutchison & Southern.—T. W. Gear, Superintendent of the Litchfield, Carrollton & Western, has resigned to become General Superintendent of the H. & S., with headquarters at Hutchison, Ill. Mr. Gear's former headquarters were at Carlinville, Ill.

Iowa Central.—G. W. Talbot, heretofore Traveling Freight Agent of the Des Moines, Northern & Western, has been appointed Traveling Freight Agent of the I. C., with headquarters at Marshalltown, Ia.

Indiana, Illinois & Iowa.—Geo. H. Ross, heretofore Superintendent of Car and Freight Train Service on the Chicago, Burlington & Quincy, has been appointed Traffic Manager of the I., I. & I.

Kansas City, Pittsburgh & Gulf.—J. I. Hazzard, formerly General Agent of the Freight Department of the Atchison, Topeka & Santa Fe, at Cincinnati, has been appointed General Agent of the K. C., P. & G., at Chicago, to succeed C. A. Shank, resigned. E. F. Serviss, Commercial Agent at Kansas City, Mo., has resigned. He is succeeded by D. Benjamin Drake, heretofore clerk in the general freight office, Kansas City. Mr. A. F. Barnett, heretofore Contracting Freight Agent of the Mobile & Ohio, with headquarters at New Orleans, has been appointed General Agent to succeed R. W. Lightburne, Jr., promoted. (Aug. 19, p. 602.)

L. J. Polk has been appointed to the newly created office of Live Stock Agent, with headquarters at Houston, Tex.

Kansas, Oklahoma Central & Southern.—The officers of this company referred to in the Construction column are: President, J. H. Bartles, Bartlesville, I. T.; Chief Engineer, B. J. Dalton, Bartlesville; Attorney, S. M. Porter, Caney, Kan.

Lehigh Valley.—W. O. Spriggs has been appointed Superintendent of the Easton & Amboy and Lehigh Divisions. The appointment will take effect Sept. 1. Mr. Spriggs was heretofore Superintendent of the Nashville Division of the Southern, with headquarters at Asheville, N. C.

Geo. R. Chesbrough has been appointed Chief Clerk of the Passenger Department, headquarters in New York.

Louisville, Evansville & St. Louis.—C. A. Bradley has been appointed Secretary to R. A. Campbell, General Freight and Passenger Agent, with headquarters at St. Louis.

Macon & Birmingham.—M. J. Chancey, Freight and Ticket Agent at Macon, Ga., has been appointed General Freight and Passenger Agent to succeed R. Garnett Stone, resigned. Mr. Stone goes with the Georgia Pine as General Manager. (Aug. 19, p. 602.)

Mexican Central.—J. T. Whalen, formerly Commercial Agent of the Chicago, Milwaukee & St. Paul, with headquarters at St. Louis, has been appointed Traveling Freight and Passenger Agent of the M. C., with headquarters at Chicago, Ill.

Missouri, Kansas & Texas.—W. I. Burnett, Traveling Passenger Agent, with headquarters at Detroit, Mich., has resigned.

Natchez, Columbia & Mobile.—The officers of this company referred to in the Construction column are: President, J. S. Butterfield, 908 Association Bldg., Chicago, Ill.; Vice-president and General Manager, C. S. Butterfield, Norfield, Miss.; Treasurer, W. W. Butterfield, Chicago; Secretary, F. A. Arend, Chicago; Superintendent and Traffic Manager, R. B. Butterfield, Norfield; Chief Engineer, W. H. Knowlton, Minneapolis, Minn.; Road Master, W. R. Jones, Norfield.

New York Central & Hudson River.—H. A. Stahl, heretofore assistant to the Chief Engineer, Chicago & Great Western, has resigned to accept a similar position with N. Y. C. & H. R., with headquarters in New York.

Norfolk & Western.—J. B. Connors has been appointed Trainmaster, with headquarters at Crewe, Va.

Omaha & St. Louis.—J. B. Keefe has been appointed Traveling Freight Agent of the Omaha, Kansas City & Eastern, and Omaha & St. Louis, with headquarters at Omaha, Neb.

Plant System.—S. S. Fitzsimmons, heretofore Superintendent of the Southwestern Alabama, with headquarters at Enterprise, Ala., has been appointed Superintendent of the Alabama Midland, or Third Division of the Plant System, succeeding W. P. Harris, resigned, with headquarters at Montgomery, Ala. (July 22, p. 538.)

Geo. T. McClure, contracting Freight Agent of the Plant System at Cincinnati, has been transferred to Jacksonville, Fla. (Aug. 19, p. 602.)

Richmond, Fredericksburg & Potomac.—W. P. Taylor, who was recently appointed Traffic Manager, was heretofore Chief Clerk to Traffic Manager C. A. Taylor. His appointment takes effect Sept. 1.

St. Louis & San Francisco.—W. A. Tuley, heretofore Traveling Passenger Agent, with headquarters at Dallas, Tex., has been appointed Southwestern Passenger Agent, with office at the same point. The position of Northwestern Passenger Agent, now occupied by H. M. Fickinger, was created Aug. 1, on account of the new business of the Kansas City extension, which will be put in operation Sept. 1.

W. C. Preston has been appointed Traveling Freight Agent, with headquarters at Houston, Tex., vice J. W. Mass.

St. Louis, Peoria & Northern.—G. A. Hackett has been appointed Traveling Passenger Agent, with headquarters at St. Louis, Mo.

Southern.—Frederick Heale, who has been Division Rate Clerk at Washington, has been appointed Chief Rate Clerk in the General Freight office in Louisville. Mr. Heale succeeds A. R. Smith, recently appointed Secretary of the Mississippi Valley Freight Association.

H. B. Spenser, Assistant Superintendent of the Alabama Great Southern at Birmingham, Ala., will be appointed Superintendent of the Louisville Division of the Southern. He will be succeeded by C. E. Rickey, who is now Chief Clerk to Superintendent Wickersham of the Alabama Great Southern.

Spokane Falls & Northern (Great Northern).—A. M. Thomas, who has been connected with the Auditing Department of the Great Northern at St. Paul, has been appointed Auditor of the S. F. & N.

Toledo & Northwestern.—This road, which suspended operations last spring, has been reorganized with the following Directors: Green B. Raum and Wm. McDonald, Chicago, Ill.; S. A. Williams, Cleveland, O.; Richard Corcoran, Lewis F. Wright and F. E. Young, Albion, O. The Board elected the following officers: Green B. Raum, President; Richard Corcoran, Vice-President; Lewis F. Wright, Secretary. (See News column.)

Union Pacific.—W. L. Clark has been appointed Assistant Superintendent of the Omaha & Republican Valley, and the Kearney & Black Hills lines north of Grand Island, with headquarters at Omaha, Neb.

J. A. Foley, who since June, 1891, has been Superintendent of the O. & R. V. Division, at Lincoln, Neb., has resigned that position. The jurisdiction of H. E. Flavin has been extended to include the lines south of Valley; and the jurisdiction of W. L. Park, Assistant Superintendent, has been extended over the Second District of the road in Nebraska, including the Grand Island Station. Mr. Park is appointed Assistant Superintendent of the branch line north of Grand Island and Kearney. The Division headquarters of the O. & R. V. will be changed from Lincoln, Neb., to North Platte, Neb. The position of Superintendent of Shops, lately held by J. O'Hearn, has been abolished. The territory of Division Master Mechanic Davies has been extended to include the Cheyenne shops.

Wabash.—W. A. Bell has been appointed Master Mechanic of the Wabash Terminals in Chicago.

Western & Atlantic.—The office of Traffic Manager, held by Joseph M. Brown, has been abolished and the duties of the office will henceforth be looked after by H. F. Smith, lately appointed Traffic Manager of the Nashville, Chattanooga & St. Louis. (Aug. 12, p. 586.)

White Pass & Yukon.—W. H. Garlock has been appointed Master Mechanic. This road starts from Skaguay, Alaska. The headquarters of the company are in Seattle, Wash.

Wisconsin Central.—O. P. Gothlin has resigned his position as General Agent at Cincinnati. He will leave railroad service.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

ALABAMA & FLORIDA.—Locating surveys are completed and grading was begun August 5 on this line from Georgiana, Ala., southeast to Geneva, and possibly to St. Andrews Bay via River Falls and Andalusia. R. M. Quigley & Co., of St. Louis, Mo., have the contract. About 1,000 men are at work. The work is not especially difficult. The grades run about 1 per cent. and the maximum curves are 4°. There will be two 100-ft. iron bridges and one bridge of 50 ft. Rails for 30 miles are wanted at once. This road has been referred to in this column heretofore as the Florida & Alabama. (Aug. 12, p. 587.) E. L. More of River Falls, Ala., is President and Chas. Seymour of Georgiana, Ala., Chief Engineer. (Official.)

ATCHISON, TOPEKA & SANTA FE.—The contract for laying 12 miles of double track between Sterry and Strong City, Kan., has been awarded to the J. A. Ware Construction Company of St. Louis. (April 8, p. 265.)

This company is reballasting its track from Los Angeles to San Diego, Cal., 18 miles. New ties and tie plates are also being put in.

ATLANTIC, VALDOSTA & WESTERN.—The railroad between Haylow, Ga., and Crawford, Fla., is completed and in operation. (May 20, p. 366.) On the extension from Haylow to Valdosta about 100 men and a number of teams are at work. J. D. Hardman, Quitman, Ga., has signed a contract covering about four miles of heavy work in the vicinity of the Allapaha River and other small contracts are being let frequently. (Official.)

BALTIMORE & OHIO.—H. L. Horton, Ernst Thalmann, James M. Davis and O. S. Wood, who have been appointed a committee of the bondholders of the Staten Island Rapid Transit Company, give notice to holders of income bonds and stock that the time to deposit their bonds and stock with H. L. Horton & Co. will expire Sept. 15. (July 22, p. 539.)

Contracts have been let for the building of 1¾ miles of siding at North Siding, near Mansfield, O., to be completed by Sept. 1.

BOSTON & MAINE.—Seventy-five-pound rails are being laid between Nashua, N. H., to Worcester, Mass., a distance of 47 miles. They are replacing 56-lb. rails.

CANADIAN ROADS.—A grant has been given and surveys are made for a railroad from Charlottetown, P. E. I., to the southern portion of the island beyond the Hillsborough. A difficulty to be overcome is bridging the Hillsborough, which, at Charlottetown, is about three-fourths of a mile wide. The Dominion Government is asking the Provincial Government to co-operate in building the bridge by making it one for ordinary traffic also.

The Montreal Herald of Aug. 22 prints a news dispatch from Toronto which states that Capt. R. A. Middleton, who has been promoting the Brantford & Woodstock road (referred to in these columns for Juyl 22, p. 538) has been identified as another man, known as Alexander McDonald, and that his attempts to promote this road are a failure.

CANTON, ABERDEEN & NASHVILLE.—An official of the Illinois Central writes that it is the intention to build a spur 8.88 miles long from Winfield, Ala., on the Kansas City, Memphis & Birmingham. This is to be in the direction of West Point, Miss., which is on the Aberdeen branch of the I. C., about 60 miles from Winfield. (Aug. 12, p. 586.)

CHEAT VALLEY.—Work is closed for the summer on this proposed line from Rawlesburg, W. Va., to Point Marion, Pa., 40 miles. Track has been laid for six miles. (July 29, p. 555.) J. J. Stoer of Rawlesburg is President. (Official.)

CHICAGO GREAT WESTERN. — Construction crews are engaged in filling in the two high trestle works near Afton Junction, Ia.

CHICAGO, INDIANA & EASTERN.—Grading is complete for 12 miles on the extension from Fairmount, Ind., to Converse and track is laid for 11 miles. There are 90 men and 40 teams at work. (June 24, p. 466.) H. E. Drew, of Fairmount, Ind., is General Manager. (Official.)

CHICAGO, PEORIA & ST. LOUIS.—Over 800 men are now at work on this road, working north from Jerseyville, Ind. Twenty-five miles of track has already been rebuilt, and 20 carloads of gravel are being used daily for ballasting. It is the intention to complete the work as far as Springfield this year, a distance of 64.8 miles. Next year the tracks between Jerseyville and St. Louis will be ballasted.

CHICAGO TERMINAL TRANSFER.—All the grading is completed on the extension from Franklin Park, just outside the city of Chicago, east 6.75 miles to Mayfair, within the city limits. (June 3, p. 399.) Track is laid as far as the Des Plains River, 0.75 mile. The sub-structure and approaches of the bridge over the Des Plains River are completed. There are about 70 men at work. (Official.)

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Two miles of side track laid to quarries at Laurel, Ind., on the Whitewater Division is now completed and has been in operation for the past few days.

COLUMBUS, SANDUSKY & HOCKING.—The bondholders opposed to the reorganization of the Mercantile Trust Company (May 27, p. 384) have formed a protective committee which will ask the bondholders to deposit their bonds with the North American Trust Company, New York.

COOS BAY, ROSEBURG & EASTERN.—Surveys are completed and building is in progress on the proposed extension of three miles from the main line in Coos County, Ore., to the Klondike mine. (July 22, p. 528.) Grading is being done by the company and 50 men are at work. (Official.)

CRYSTAL RIVER.—Work is begun, according to report, on this line from Carbondale, Colo., on the Aspinook extension of the Denver & Rio Grande, to run up Crystal River toward the Yule Creek marble beds. This road was incorporated several years ago, but the panic of 1893 caused suspension of work. In 1896 the roadbed, right of way and five miles of track were sold to Orman & Crook of Pueblo, Colo. (Nov. 20, 1896, p. 816.)

DENVER & RIO GRANDE.—Contracts are soon to be let, according to report, for two branches in Salt Lake County, one from Bingham to Highland Bay, five miles, and the other from Murray to a new smelter, three miles.

DETROIT & LIMA NORTHERN.—About 75 men are reported at work on the Toledo & Ottawa Beach extension from Toledo, O., north 40 miles to Trenton, Mich. Now that the Columbus Northwestern Division is nearing completion, it is expected that work will be pushed on this northern extension. (May 27, p. 383.)

DOOLY SOUTHERN.—This line from Richwood, Ga., southeast about nine miles to Pinia is completed and in operation.

DULUTH & NORTHERN MINNESOTA.—The road which this company is building is simply for logging purposes and is to be only eight or nine miles long for the present, to reach some timber. (June 3, p. 399.) The track is laid for several miles from Knife River, Minn., and all the grading is practically completed. There will be no regular train service. The work is being done by the company. (Official.)

EL PASO & NORTHEASTERN.—Rails are laid for 87.5 miles on the main line from El Paso, Tex., northeast to Alamogorda, N. M. (June 24, p. 467.) The entire line will reach to White Oaks, 160 miles. On the branch of 39 miles from Alamogorda east to the Sacramento Mountain five miles is completed. The present objective point is Salado, N. M., where the New Mexico Railway & Coal Co., which is building the line, owns large coal fields. This branch is standard gage, with a maximum grade of 5.2 per cent. and a maximum curvature of 30 deg. (Official.)

FLAT RIVER.—This company has been incorporated in Missouri to build a line from Farmington to the Mississippi River. W. B. Cole and Edward Whitaker of St. Louis are among the incorporators.

GALLATIN.—The Gallatin Development Company of Bozeman, Mont., has received the contract for building the Trail Creek Division of this line from Three Forks, Mont., on the Northern Pacific, about 100 miles to coal fields. The section is to be built by Oct. 15. (Aug. 12, p. 587.)

GRAND MARIAS & NORTH SHORE.—Surveys are completed, according to report, for the terminals at Grand Marias and the line is being run from that point toward Port Arthur. E. E. Lewis, of Duluth, Minn., is among the projectors. (Aug. 19, p. 603.)

GREAT NORTHERN.—About 5,000 men are at work on the Fosston Branch from Fosston, Minn., east to Deer River. About 50 miles of track has been laid from Deer River west and practically all the grading is completed. Track is being laid at the rate of over two miles a day, and it is expected to have the line ready for operation in September. Grading is completed on the line from Saunders, Wis., to Colquet, Mich., 27 miles, and all but eight miles of track is laid. From Colquet to Deer River the recently acquired Duluth, Superior & Western will be used. Work is well advanced on the extension of the Park Rapids & Leech Lake from Ackley, Minn., north to a connection with the Fosston Branch at Cass Lake, and it is expected that track-laying will begin early next month. (June 17, p. 444.)

INDIANA STONE.—E. C. Field, Chief Counsel of the Chicago, Indianapolis & Louisville, is reported to have finished the details for building the I. S., which is to run from the C., I. & L. at Bedford, Ind., into stone fields, about 10 miles. It will require 16 bridges.

KANSAS, OKLAHOMA CENTRAL & SOUTHWESTERN.—This line is surveyed for 200 miles and cross-sectioned for 60 miles. (Aug. 19, p. 603.) Grading is completed for 30 miles and the company expects to have the 60 miles graded by Oct. 1. The contract for this section is let to the Toledo Construction Co. The work is easy. On this section there will be two steel bridges, each 125 ft. long. The line is to be laid with 60-lb. rails. The road is projected to extend from Cherryvale, Kan., south via Guthrie, El Reno and Ft. Sill, Okla., to Vernon, Tex. The Knickerbocker Trust Co. is the New York representative. (Official.) The officers are given under Elections and Appointments.

LITTLE RIVER VALLEY.—Seven miles of track is completed on this line from Morris Ferry, Ark., west to the Indian Territory line. The company will complete about two miles more within the next 30 days, which will carry the line into the Territory. (June 24, p. 467.) D. C. Richardson of Horatio, Ark., is President. (Official.)

MISSOURI & PACIFIC.—Newspaper reports state that this road has a large force of men at work widening the roadbed of the Omaha Belt Line. It is reported that this line will be double tracked in the near future.

MOBILE & OHIO.—The Warrior Branch on the Montgomery Division of the Warrior River runs from Tuscaloosa, Ala., northeast 10 miles to the Tidewater Coal Mines on the south bank of the Warrior River. Of this five miles is the old roadbed of the Tuscaloosa Northern, which was graded in 1887. The other five miles is new location made last winter. It includes one steel bridge of 100 ft. span over Hurricane Creek, eight miles up the river. Location of this branch has been made some seven miles beyond the Tidewater Mines, but it is not probable that the extension will be made for some time. The grades and curves are very light, running along the bank of the Warrior River. The maximum grade in getting to the river is 2 per cent., the maximum curve 6°.

The Blockton Branch leaves the main line at Ealine Station, Ala., 27 miles south of Tuscaloosa, and runs to Blockton and Coal Mine Center in Bibbe County, 13 miles. This branch was completed and in operation about July 15. The maximum grade is 2 per cent., and maximum curve 6°. It includes two high trestles, one over Schultz Creek and the other over Hills Creek, with 50-ft. plate girder over the stream. (Official.)

NATCHEZ, COLUMBIA & MOBILE.—This proposed line is to run from Norfield, Miss., on the Illinois Central, east via McNair, Finch Siding and Ruth & Sartinville to Columbia on the Pearl River. The company is doing its own work and building from three to five miles per year. The grade is completed on 18 miles and 50 men are at work. The line will have no iron or steel bridges, but will require several long pile trestles. The company will probably want three miles of 56-lb. rails before Jan. 1. The officers are given under Elections and Appointments. (Official.)

NEW ROADS.—A contract has been let, according to report, to the Oregon Short Line, whereby that company is to supply materials for building a line from Milford, Utah, southwest 80 miles to the Nevada state line. This road is in the direction of the long-talked-of extension to Los Angeles, Cal., and when completed about 250 miles will remain to be built to that city. The road will be built over the old Pioche grade, which needs only a few repairs. The O. S. L. will furnish 52-lb. rails, four engines, two combination coaches, two passenger coaches and 104 freight cars. A. W. McCune, of Salt Lake City, Utah, is among those interested.

NORTH BEND & KETTLE CREEK.—Track is laid on the extension from Lebo Run, Pa., to Black Forest, 3½ miles, and trains are running to that point. (Dec. 10, 1897, p. 878.) The company has 50 men and four teams at work. (Official.)

NORTHERN PACIFIC.—An area in the terminal properties of the N. P. in Seattle, Wash., three blocks in length and varying from 60 to 300 ft. in width, is being filled with gravel. The amount to be filled is reported to be approximately 40,000 cu. yds., and the cost in the neighborhood of $10,000.

Track-laying is finished on the Spokane & Palouse Branch from Pullman, Idaho, to Lewiston, 20.6 miles. (July 1, p. 485.)

OKLAHOMA CENTRAL.—This company was incorporated in Oklahoma Territory, Aug. 15, with a capital stock of $15,000,000, to build a line from Oklahoma City through the counties of Canadian, Kingfisher, Blaine and Wood to the Kansas state line. The incorporators are: O. P. Hamilton, Saline, Kan.; Herman Bruen, New York; Paul Cooke, Kansas City; S. C. Burrell and Philip Koch, Watonga, Okla.; Thomas H. Davis, Saline, Kan., and McGregor Douglas, Oklahoma City.

PHILADELPHIA & READING.—Bids are invited for the extension of the freight yards at Shippensburgh, Pa. The improvement will be about 1½ miles in length and will make another connection with the Western Maryland tracks outside the city limits. This will do away with a heavy grade.

PITTSBURGH & LAKE ERIE.—This company is reported to have begun widening the bridge over the Youghiogheny at McKeesport, Pa., preparatory to laying a double track.

PLANT SYSTEM.—The many improvements at Jacksonville, Fla., Union Terminal are being made mainly by the Plant system. Since the first of the year nearly $100,000 has been expended on the work, which has consisted in the filling in of swampy ground around the track in the yards, the changing and placing of additional yard tracks and building new warehouses.

RICHMOND, PETERSBURG & CAROLINA.—Work on this line has been seriously delayed by the contractor. The construction company has taken the work off his hands and will now push it with vigor. (Aug. 5, p. 571.)

RIO GRANDE & WESTERN.—The grading on the cut off between Springville and Mapleton, Utah, is progressing quickly and the work will be completed by Sept. 15. The line being built amounts to about three miles, cutting off 1¼ miles between the stations named, besides reducing the grade to an easy one. (April 1, p. 246.)

ST. ANTHONY & NATIONAL PARK.—This company has been incorporated in Idaho with a capital stock of $350,000 to build a line in Fremont County from the Oregon Short Line east 30 miles to St. Anthony. The directors are C. H. Moon, President; S. R. Finley, Secretary; M. E. Jamison, Treasurer; G. C. Baker, C. P. Bartlett and R. J. Costlett of St. Anthony and M. J. Kerr of Ora.

SIERRA OF CALIFORNIA.—This line is to be extended, according to report, about 20 miles from Jamestown, Cal., north into the sugar pine belt. The line now runs from Oakdale east 41 miles to Jamestown and was completed early this year. T. S. Bullock, of Jamestown, is General Manager. (Feb. 11, p. 110.)

SOUTHERN.—This company has issued a circular dated Aug. 13, announcing the opening of the Castleman Branch from Castleman Junction, Ala., Mile post 798.8, Birmingham Division to Castleman, Ala., 3.7 miles. This extension has been heretofore referred to as from Leeds to the ore mines of the Sloss Iron & Steel Co. (April 29, p. 317.)

SOUTHERN PACIFIC.—Track-laying is reported begun on the extension of the Thibodeau Branch in Louisiana from Thibodeau northwest about 15 miles to Napoleonville. (May 13, p. 349.)

Surveys are being made, according to report, for a spur track from the main line of the S. P. at Tehachapi, Cal., to a lime plant a short distance east.

TEXAS CENTRAL.—Surveys are reported in progress for an extension from Ross, Tex., southeast 10 miles to Maco.

WESTMORELAND JUNCTION.—This company was incorporated in Pennsylvania Aug. 22 with a capital stock of $60,000 to build a line in Westmoreland County from North Irwin to Guffey's Station, on the Connellsville Branch of the Baltimore & Ohio. The directors are A. Frank (President), J. D. Brown, T. P. Herron, D. A. Kelley, G. H. Tuxford, J. Arthur Jones and T. D. Lauffer. Irwin, Pa.

WYOMING & MISSOURI RIVER.—About one-half of the grading is completed on this line from Belle Fourche, S. Dak., up Hay Creek Valley 18 miles to Barrett, Wyo. The maximum grade is 1 per cent., the maximum curves 6°. The line is under contract to be completed Oct. 1. Heckert & Harris of Deadwood, S. Dak., have the contract. (Aug. 12, p. 587.) Geo. M. Nix of Belle Fourche is President and F. C. Tucker, Chief Engineer. B. J. Hoffacker of 20 Broad street, New York is the Eastern representative. (Official.)

Electric Railroad Construction.

ANDERSON, IND.—Congressman C. L. Henry and ex-State Chairman George McCullough are forming a company to build an electric railroad between this city and Muncie, about 20 miles. The proposed route is as follows: Indiana Mounds, Chesterfield, Daleville, Yorktown and West Muncie, to a connection with the Muncie electric railroad.

BENTON FALLS, ME.—It is reported work was commenced Aug. 22 on the new electric road from Benton Falls to Benton, three miles. Elisha Morgan and Edwin W. Heath of Benton Falls are interested in the project. (July 8, p. 503.)

BRADFORD, PA.—The Bradford Electric St. Ry. Co. contemplates increasing its capital stock for the purpose of building an extension to Lewis Run.

CHICAGO, ILL.—The Chicago General Ry. Co. has under consideration the organization of a department to build a trolley line cartage business from the factories along the lines of the company to the steam railroads. It is proposed to build switch tracks into all such factories, and also along the team tracks at the steam roads. Flat cars of 10 to 15 tons' capacity will be used in conducting this cartage business. This company's tracks now intersect with the following roads: Rock Island, Pennsylvania, Wabash, Eastern Illinois, Monon, Santa Fe, Lake Shore, Grand Trunk, Erie, Illinois Central, Alton, Burlington, Panhandle, Baltimore & Ohio, Western Indiana, Northern Pacific and Stock Yards Transit Co.

DUNKIRK, IND.—The Dunkirk & Redkey Traction Co. is incorporated, with a capital stock of $75,000, to build a road from Dunkirk to Redkey, Jay County, about four miles. Among the incorporators are Charles A. Hasbroock, Elmer Bishop and H. C. Billingsley.

EAST ST. LOUIS, ILL.—The East St. Louis & Collinsville Electric RR. Co., recently incorporated, is reported to have sold its franchise and right of way to the Mississippi Valley Electric Ry. Co. of St. Louis, Mo., of which J. H. Mehling is President.

ESCANABA, MICH.—The Escanaba Electric St. Ry. Co., it is reported will build two short extensions and will put on several additional cars. The company was recently reorganized and the following officers elected: A. R. Moore, President and Manager; O. B. Fuller, Vice-President; I. C. Jennings, Secretary; Edward Erickson, Treasurer.

HATBORO, PA.—The Hatboro & Horsham Electric Ry. Co. is chartered, with a capital stock of $6,000, to build a line 1.25 miles long in Hatboro. The directors are: Magnus Hellstrom, President; James Crawford and Alfred R. Gandy, Philadelphia; James Crawford, Doylestown, and John B. Peddle, Woodbury, N. J.

LOS ANGELES, CAL.—The Los Angeles Terminal Ry. was recently awarded an electric railroad franchise in Pasadena, and will shortly convert the Pasadena and Glendale branches, but maintain the steam service for freight. Extensions of some 15 miles will be made for electric service in addition. All electric lines will be 3 ft. 6 in. gage, to conform to lines of the Los Angeles Electric Co. in Los Angeles, with which road the Terminal Ry. has trackage arrangements. The company has completed a short extension of one and one-half miles to a stone quarry three miles north of Pasadena. It is not improbable that work may be begun on the final location over the mountains toward Salt Lake shortly. (March 25, July 22; pp. 225, 539.)

MILFORD, MASS.—Charles W. Shippel has petitioned for a franchise to build an electric railroad from Milford to Hopkinton, and a hearing will be given by the Selectmen Sept. 1. Others interested in the road are Joseph G. Ray, Edgar K. Ray, Geo. W. Wiggin and W. S. Reed.

NASHUA, N. H.—The Nashua St. Ry. Co. contemplates building an extension to Tyngsboro, Mass.

OREGON CITY, ORE.—W. H. Burghardt has applied to the court of Clackamas County for a franchise to build an electric railroad from Oregon City, south about eight miles in the direction of Highland.

ROCHESTER, N. Y.—The Rochester & Sodus Bay Ry. Co. is incorporated, with a capital of $1,000,000, to build an electric railroad from Sodus Point, Wayne County, on Lake Ontario, to and partly through the city of Rochester. The road will be about 42 miles long. Rights of way have been secured, and it is expected that work will be begun this fall. The officers are T. J. Nicholl, President; J. C. Tone, First Vice-President; Walter B. Duffy, Second Vice-President; John H. Gregory, Treasurer; Charles Van Voorhis, Secretary. (June 3, p. 400.)

ST. LOUIS, MO.—Local papers state that J. D. Houseman, Jr., of the St. Louis & Kirkwood RR., is organizing a company to build another electric railroad to the Meramec River. The proposed line will be about 20 miles long.

ST. THOMAS, ONT.—The St. Thomas Electric Ry. Co., which recently completed its road of about six miles, plans to extend the road to Port Stanley, nine miles south, and possibly to London, 15 miles north. Concerning the line just opened, U. S. Consul Burke says:

With the exception of the overhead joints and fixtures, which were purchased from the Ohio Brass Company, of Mansfield, the line was built and equipped with Canadian material, the total cost being $35,000. The rails were made at Hamilton, Ontario, the engines at Amherst, N. S.; dynamos and electrical equipment were bought of the Canadian General Electric Company, Toronto; and the motors, eight in number, and two trailers, were made by the Ottawa Car Company.

SAN FRANCISCO, CAL.—The Market St. Ry. Co. is changing as fast as possible its horse car lines to electric. Work is now either under way or contemplated on the following routes: Market, Bryant, Sixteen and Eighteenth streets, to South San Francisco; on Folsom street, Precite avenue, Aring street and San Bruno avenue; Sixth, Market, Post and Montgomery streets; from St. Mary's College on Mission street north to Whirlwind Gulch, and application has been made to the Supervisors for an extension along Jefferson street.

YOUNGSTOWN, O.—The Mahoning Valley Ry. Co. will build an extension to Struthers, five miles.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

June 30.		1898.	1897.	Inc. or Dec.
Chicago & Eastern Illinois.				
12 months.....	Gross	$4,221,438	$3,927,610	I. $293,828
12 "	Net	1,601,806	1,503,695	I. 98,111
Chicago Great Western.				
12 months.....	Gross	$5,386,043	$4,680,359	I. $705,154
12 "	Net	1,435,671	1,100,272	I. 335,399
Kansas City, Fort Scott & Memphis.				
1 month.....	Gross	$365,575	$365,043	I. $532
1 "	Net	97,796	100,604	D. 2,808
12 months.....	Gross	5,083,572	4,513,454	I. 469,918
12 "	Net	1,574,005	1,353,359	I. 120,646

June 30.		1898.	1897.	Inc. or Dec.
Kansas City, Pittsburgh & Gulf.				
12 months	Gross	$5,083,372	$4,613,354	I. $469,918
12 "	Net	1,574,005	1,453,359	I. 120,646
Lake Erie & Western.				
1 month	Gross	$252,166	$293,179	D. $41,013
1 "	Net	72,328	111,846	D. 39,518
6 months	Gross	1,648,780	1,635,748	I. 13,032
6 "	Net	613,362	637,896	D. 24,533
New England.				
3 months	Gross	$1,390,626	$1,376,293	I. $14,333
3 "	Net	378,129	439,948	D. 61,819
New York, Chicago & St. Louis.				
3 months	Gross	$1,412,847	$1,244,253	I. $168,594
3 "	Net	251,773	246,139	I. 5,634
6 months	Gross	2,982,205	2,555,237	I. 426,968
6 "	Net	507,611	459,215	I. 48,396
New York, Ontario & Western.				
12 months	Gross	$3,914,635	$3,894,402	I. $20,233
12 "	Net	1,112,992	1,113,907	D. 915
Rio Grande Western.				
12 months	Gross	$3,362,284	$2,468,496	I. $895,760
12 "	Net	1,294,111	864,956	I. 429,155
Southern.				
12 months	Gross	$21,095,839	$19,079,500	I. $2,016,339
12 "	Net	6,593,974	5,846,344	I. 747,630

July 31.		1898.	1897.	Inc. or Dec.
Cincinnati, New Orleans and Texas.				
1 month	Gross	$400,539	$312,602	I. $87,937
1 "	Net	143,293	101,303	I. 41,990
Pittsburgh, Cincinnati, Chicago & St. Louis.				
1 month	Gross	$1,231,892	$1,171,245	I. $60,647
1 "	Net	360,028	382,205	D. 22,177
7 months	Gross	8,771,176	8,009,418	I. 761,758
7 "	Net	2,010,862	2,195,118	D. 184,256
Southern.				
1 month	Gross	$1,971,173	$1,607,674	I. $363,499
1 "	Net	538,697	395,369	I. 143,328

AUSTIN & NORTHWESTERN.—The Attorney-General of Texas has filed suit against this road for forfeiture of the charter and the appointment of a receiver on the ground that it has been illegally consolidated with the Southern Pacific, which owns $1,008,000 of the $1,016,000 capital stock.

BALTIMORE & OHIO.—After Aug. 20, deposits on bonds and stocks under the reorganization plan will be accepted only upon a cash payment of 2 per cent. of the par value of the bonds and an additional cash payment of $2 a share on stock. (July 1, p. 486.)

CENTRAL OHIO.—This company has filed an intervening petition in the United States Circuit Court at Columbus, O., against the Baltimore & Ohio to secure $1,000,000 rental alleged to be due it from the B. & O., for use of line and rolling stock under lease executed Dec. 1, 1866. The C. O. has attempted in vain to obtain a separate receivership from the parent company. (June 17, p. 446.)

CENTRAL PACIFIC.—Sir William Marriott and Walter Morshead of London, who are in this country representing certain English stockholders, have made a proposition to the Attorney-General in which they ask the United States Government to protect the interests of the English stockholders and claim to be able to effect the reorganization of the road on the following lines: The United States Government is to provide for the taking up of the first mortgage bonds and the road is then to be sold by order of the court to representatives of the English stockholders, who say they are able to refund the present indebtedness at four per cent. and place the road on a paying basis. Attorney-General Griggs states, that he is preparing a bill to foreclose the road, which will be presented to the incoming Congress. (July 8, p. 504.)

CHICAGO & WESTERN INDIANA.—Ninety-four of the first mortgage bonds of 1879 have been drawn for payment at 105 from the sinking fund on Nov. 1, at the office of J. P. Morgan & Co., New York.

DENVER, LEADVILLE & GUNNISON.—The date for the sale is fixed at noon, Sept. 15, at West Denver, Col. (Aug. 19, p. 604.)

ERIE & HURON.—Press reports state that the Lake Erie & Detroit River has bought the Erie & Huron, which runs from Sarnia, Ont., to Rondeau, 71.5 miles, at $750,000. The L. E. & D. R. extends from Walkerville, Ont., to Ridgetown, 84 miles.

GREAT NORTHERN.—A circular issued in connection with the call for the annual meeting for Oct. 13, states that business will be considered as follows:

(1.) The increase of the capital stock of the Great Northern Railway Company for the purpose of acquiring, by exchange or otherwise, the capital stock of the St. Paul, Minneapolis and Manitoba Railway Company, with the view of consolidating the properties of the two companies.

(2.) The total capital stock of the Great Northern Railway Company, as now legally established, consists of $50,000,000 preferred, and authority to issue $20,000,000 common in addition thereto, no part of which has been issued. It is proposed that the authority to issue common stock be surrendered, and that hereafter the capital stock of the Great Northern Railway Company shall consist of a single class, with uniform rights and qualities. (June 24, p. 468.)

JAMESTOWN & LAKE ERIE.—Attorneys for the bondholders have begun foreclosure proceedings against this road, which runs from Jamestown, N. Y., to the Western New York & Pennsylvania Junction, 21.17 miles, with a branch from Mayville to Chatauqua, 2.68 miles. The capital stock is $350,000 and the funded debt $300,000. The foreclosure is on account of default in payment of interest on the bonds.

KANSAS MIDLAND.—Press reports state that the St. Louis & San Francisco has bought this line, which extends from Wichita, Kan. to Ellsworth, 107 miles. A decree of sale was issued in March last, the upset price named being $500,000, but the public sale did not take place, since under the laws of Kansas three years must elapse before the sale in the absence of a petition of a majority of the stockholders praying for an earlier sale. (May 6, p. 334.)

KEARNEY & BLACK HILLS.—At the mortgage sale held at Kearney, Neb., Aug. 18, Vice-President W. D. Cornish, of the Union Pacific, bid in the road at $150,000. It runs from Kearney to Callaway, 65.74 miles, and went into the hands of receivers with the Union Pacific Oct. 13, 1893. (July 29, p. 556.)

LITCHFIELD, CARROLLTON & WESTERN.—Judge Allen in the United States Circuit Court at Springfield, Ill., Aug. 19, entered a decree for foreclosure sale of this road at a date not fixed. The line runs from Columbiana, Ill., to Burnett, 51.5 miles. A receiver was appointed May 23, 1894. The capital stock is $600,000 and the funded debt $516,000. Interest has been in default since 1894.

LOUISVILLE & ST. LOUIS.—This road on Aug. 15 passed into the possession of the Louisville, Evansville & St. Louis, the consideration being $80,000. The Louisville & St. Louis runs from Centralia, Ill., to Drivers, 16.4 miles, and has been leased since July 1, 1896, to the Jacksonville & St. Louis. The L. & St. L. went into the hands of receivers several years ago. (June 3, p. 400.)

NEW YORK & OTTAWA.—The New York State Board of Railroad Commissioners has given this company permission to increase its capital stock from $1,380,000 to $3,000,000. (June 17, p. 446.)

OMAHA & REPUBLICAN VALLEY.—At the mortgage sale held at Lincoln, Neb., Aug. 18, W. D. Cornish, Vice-President of the Union Pacific, and Lawrence Greer were the only bidders. The extension mortgage went to them at $20,000 and the second mortgage at the upset price, $750,000. It has a total mileage of 482.04 miles. It went into the hands of receivers with the Union Pacific Oct. 13, 1893. (U. P. July 1, p. 486.)

PANAMA.—The Central Trust Co. of New York will receive proposals for first mortgage bonds not to exceed par value and accrued interest, the total offer not to consume more than $150,000. (April 15, p. 286.)

PORT ARTHUR, DULUTH & WESTERN.—A Toronto, Can., dispatch states that this road, which runs from Port Arthur, Ont., southwest 91.25 miles to Gunflint Iron Mines, Minn., has been sold to Mackenzie, Mann & Co., who own the proposed Ontario & Rainy River and other roads in Canada.

SOUTHERN OHIO.—The date of the foreclosure sale has been postponed from Aug. 20 to Sept. 20. (July 15, p. 523.)

TEXAS TRUNK.—A letter from the receiver states that the press reports which credit the Southern Pacific with buying this road are incorrect. The line was sold in August, 1895, to E. H. Pardee of New York, and at that time a charter was applied for but refused, and since then the road has been run under the Federal Courts. Meanwhile parties have brought suit against the property on account of a flaw in the title, which was compromised a few days ago for $1,000. The receiver believes that if the company could get a charter, the road might profitably be extended south to Palestine or Jacksonville. The road runs from Dallas, Tex., to Cedar, 51.68 miles. Its capital stock is $750,000, and its funded debt $1,000,000.

TOLEDO & NORTHWESTERN.—This company, which was incorporated last year in Michigan to build a railroad from Albion north 24 miles to Charlotte, is reported to have been reorganized and some new capital invested in the enterprise. At last report about 20 miles of the line had been graded and the company proposed to extend the road south to Homer on the Michigan Central. S. A. Williams, of Albion, Mich., continues to be identified with the road.

UNION PACIFIC.—The reorganization committee at its final meeting, Aug. 18, appointed Louis Fitzgerald, Jacob H. Schiff, Winslow S. Pierce, Oliver Ames and E. H. Harriman, as a proxy committee to represent such stockholders of the common and preferred stock as desire at annual and other meetings of the company. At Boston, Aug. 17, Judge Lowell in the United States Circuit Court confirmed the sale of securities of the par value of $1,343,000 to Kuhn, Loeb & Co., for $409,975.

UNION PACIFIC, DENVER & GULF.—At the foreclosure sale at Lincoln Center, Kan., Aug. 20, this road was bid in by W. D. Cornish, Vice-President of the Union Pacific, for $1,300,000, the upset price. (July 29, p. 556.)

WHEELING & LAKE ERIE.—The Mercantile Trust Co. of New York has entered another foreclosure suit against this company on the $3,000,000 mortgage on the Lake Erie Division, upon which it is declared interest is due in Oct., 1897, and April, 1898. (July 22, p. 540.)

WISCONSIN CENTRAL.—James C. Colgate has begun action in the District Court at St. Paul, Minn., against John P. Neil, the Wisconsin Central Co., John A. Stewart as sole trustee of the W. C., and Henry E. F. Whitcomb and Howard Morris, to foreclose a mortgage for $1,000,000 and interest from Sept. 1, 1886. Judge Bond has appointed Chas. F. Rand of New York City receiver of the mortgaged premises in a suit by the same plaintiff to foreclose a terminal purchase money mortgage made by the Minnesota, St. Croix & Wisconsin, now a part of the W. C. system, to secure the payment of $400,000. (Aug. 19, p. 604.)

Electric Railroad News.

BUFFALO, N. Y.—The reports of the Buffalo Ry. Co. for periods ending June 30, show earnings as follows:

		1898.	1897.	Inc. or Dec.
3 months	Gross	$306,361	$315,178	D. $8,817
3 "	Net	142,156	158,252	D. 16,096

The reports of the Crosstown St. Ry. Co., which is operated by the Buffalo Ry. Co., show earnings for periods ending June 30 as follows:

		1898.	1897.	Inc. or Dec.
3 months	Gross	$116,293	$114,863	I. $1,430
3 "	Net	42,660	44,010	D. 1,450

MEMPHIS, TENN.—The first mortgage 6 per cent. bonds, in all $65,000, issued in 1881 by the City & Suburban Ry. (now merged with the Memphis St. Ry.), have been called and will be paid at par with interest on Sept. 1, at the Security Bank, Memphis.

NEW PALTZ, N. Y.—James G. Graham of Newburg was appointed temporary receiver for the New Paltz & Walkill Valley RR. Co., on the application of the directors for the voluntary dissolution of the corporation. The bond of the receiver was fixed at $50,000 and the order to show cause was set down for Dec. 1. Bonds for $150,000 were issued on May 1, 1897, secured by a mortgage on all of the company's property, rights and franchises, upon which the company is unable to pay the principal or interest. The road extends from the tracks of the West Shore Railroad at Highland, N. Y., to the village of New Paltz, Ulster County. The company was incorporated on Jan. 16, 1897, with a capital stock of $150,000, of which Cornelia D. McKeige of Brooklyn holds $100,000, Ferdinand McKeige $1,000, and other members of the family $2,500. The total liabilities are $185,730, of which $150,000 are bonds, $35,530 due general creditors for materials and loans, and $200 due employees. The official assets are $154,196, the principal items being real estate, car equipment and power house machinery, $115,000; passenger cars, $13,000; other cars, $7,800; dynamos, $6,500; engines, $3,700. Among the creditors are Ferdinand McKeige, $12,335; Westinghouse Manufacturing Co., $4,973; McSwegan & Son, $3,470; Jackson & Sharp Co., Wilmington, Del., $2,558; Coaldale Mining Co., $2,148; Christener Engineering Co., Milwaukee, $1,777, and M. & T. Peckham Co., $1,054.

WASHINGTON, D. C.—The City & Suburban Ry. has made a mortgage with the Baltimore Security & Trust Co. as trustee, to secure $1,750,000 first mortgage 5 per cent. 50-year gold bonds. This covers all the property and franchises of the company, including about 33 miles of track. The City & Suburban Ry., recently organized, operates the Eckington & Soldiers' Home and the Maryland & Washington Ry., both of the District of Columbia, and also the franchise for a line running from the District of Columbia boundary line, through Hyattsville to Laurel, formerly owned by the Columbia & Maryland Ry. (May 27, p. 384.)

TRAFFIC.

Traffic Notes.

The Mallory Line of passenger and freight steamships has resumed its trips between New York and Galveston.

Minneapolis newspapers report that the Lake lines have agreed upon a pool of the flour traffic from that city to Buffalo and farther east.

Another meeting of the roads in the Western Passenger Association will be held at Chicago Aug. 25, to consider the request of the Trans-Mississippi Exposition Managers for greater reductions in excursion rates.

No further open reductions have been announced in the Chicago-St. Paul passenger fare, but it is stated in the press dispatches that the scalpers are well supplied with split tickets which they are selling for $5.

The managers of the Vanderbilt fast freight lines and traffic officers of the New York Central, the West Shore, the Lake Shore, the Michigan Central and the Nickel Plate, meet in Buffalo this week to arrange the details of the consolidation of the freight lines.

The Oregon Railroad & Navigation Co., and the Northern Pacific are now running fruit trains through from the Pacific Coast to St. Paul twice a week, in about 90 hours. An additional train is run on other days when there are 10 or more cars ready to go.

A Kansas paper reports that the railroads west of the Missouri River are now using live stock contracts (which constitute the drover's ticket for transportation) containing a "punch photograph," in considerable detail, of the man to whom it is issued. The fraudulent transfer of stock passes has long been a serious evil in that territory.

The roads from Kansas and the other corn states to the Gulf of Mexico are making preparations for a largely increased movement of grain through the Gulf ports this season, and the lines to the Atlantic seaboard are becoming apprehensive that unless something is done speedily to check the export movement in that direction, the comparison between the tonnage at Atlantic seaboard ports and that at the Gulf ports will be still more in favor of the latter than last year.

Differential Passenger Fares Between New York and Chicago.

At a meeting held in Buffalo a few weeks ago to consider the revision of passenger fares between New York and Chicago, Mr. Daniels, of the New York Central, made a strong argument in favor of the abolition of all differentials; that is, he asked the managers of the Joint Traffic Association to require all the weaker lines to advance their rates to the basis in force over his own strong line. Mr. Daniels based his argument on the fact that the roads which for years have made lower fares, on the ground that their time or facilities were inferior to those of the New York Central and Pennsylvania, have improved their service to such an extent that the former alleged differences are no longer worthy of consideration. These lines now have good track and make reasonably fast time, and furnish all necessary or desirable sleeping, dining and parlor cars, etc. It is stated that in 1887 the standard lines carried from Chicago to New York 49,533 first and second-class passengers, and the differential lines carried 19,623; ten years later, or in 1897, the standard lines carried from Chicago to New York 34,603 first and second-class passengers, and the differential lines 37,986.

In some mysterious way Mr. Daniels' argument has been widely circulated and is being published in the daily papers, with more or less amplification. In some of these accounts the claim is made that the differentials were granted on the condition that the weak lines should pay no commission on ticket sales, but that the change in the currents of traffic, shown by the foregoing figures, indicates plainly that commission paying, and dealing with scalpers, must have been practiced by the lines which secured the most advantage. It is further intimated that Mr. Daniels, having practically won his fight against the scalpers (a statement which some people will wait a while before accepting), will make the differential question the subject of another "holy and righteous war." In short, "Differentials must go." At the same time it is admitted that the traveling public have a great love for cheap tickets, however slow or circuitous the route, and the fight will not be an easy one. But, says Mr. Daniels' press bureau, "the issue of cheap tickets is a game that two can play at. If the defunct agreements are decently interred, it is quite likely that the trunk lines would meet openly and to the bitter end any competition which the smaller fry could put up."